ISSN: 1043-3546
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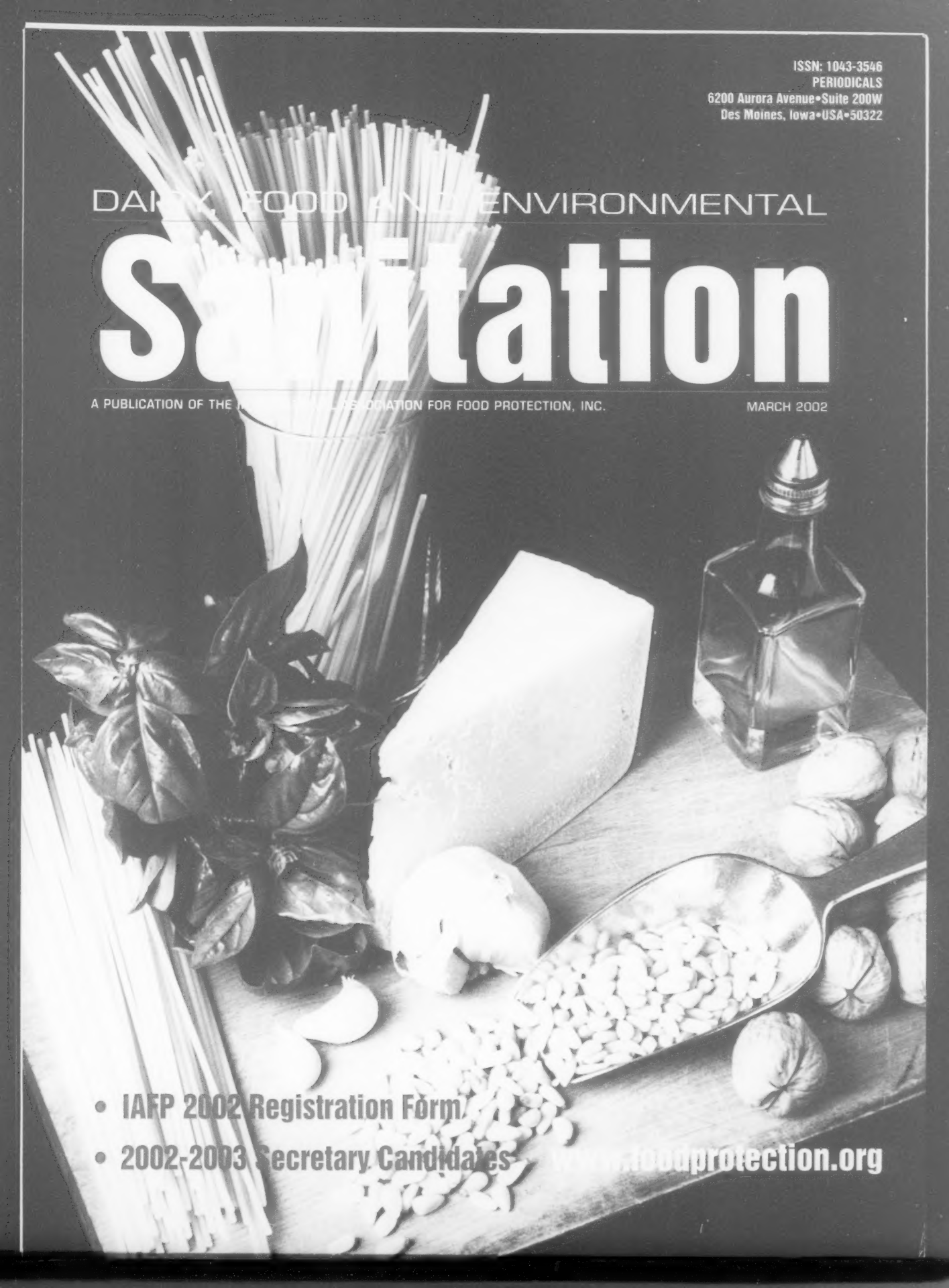
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION, INC. MARCH 2002



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Sanitation

International Association for Food Protection

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly beginning with the January number by the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, Iowa 50010, USA. Periodical Postage paid at Des Moines, Iowa 50318 and additional entry offices.

Manuscripts: Correspondence regarding manuscripts should be addressed to Donna A. Bahun, Production Editor, International Association for Food Protection.

News Releases, Updates, Coming Events and Cover Photos: Correspondence for these materials should be sent to Donna A. Bahun, Production Editor, International Association for Food Protection.

"Instructions for Authors" may be obtained from our Web site at www.foodprotection.org or from Donna A. Bahun, Production Editor, International Association for Food Protection.

Orders for Reprints: All orders should be sent to ***Dairy, Food and Environmental Sanitation***, International Association for Food Protection. Note: Single copies of reprints are not available from this address; address single copy reprint requests to principal author.

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Business Matters: Correspondence regarding business matters should be addressed to Lisa K. Hovey, Managing Editor, International Association for Food Protection.

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Claims: Notice of failure to receive copies must be reported within 30 days domestic, 90 days outside US.

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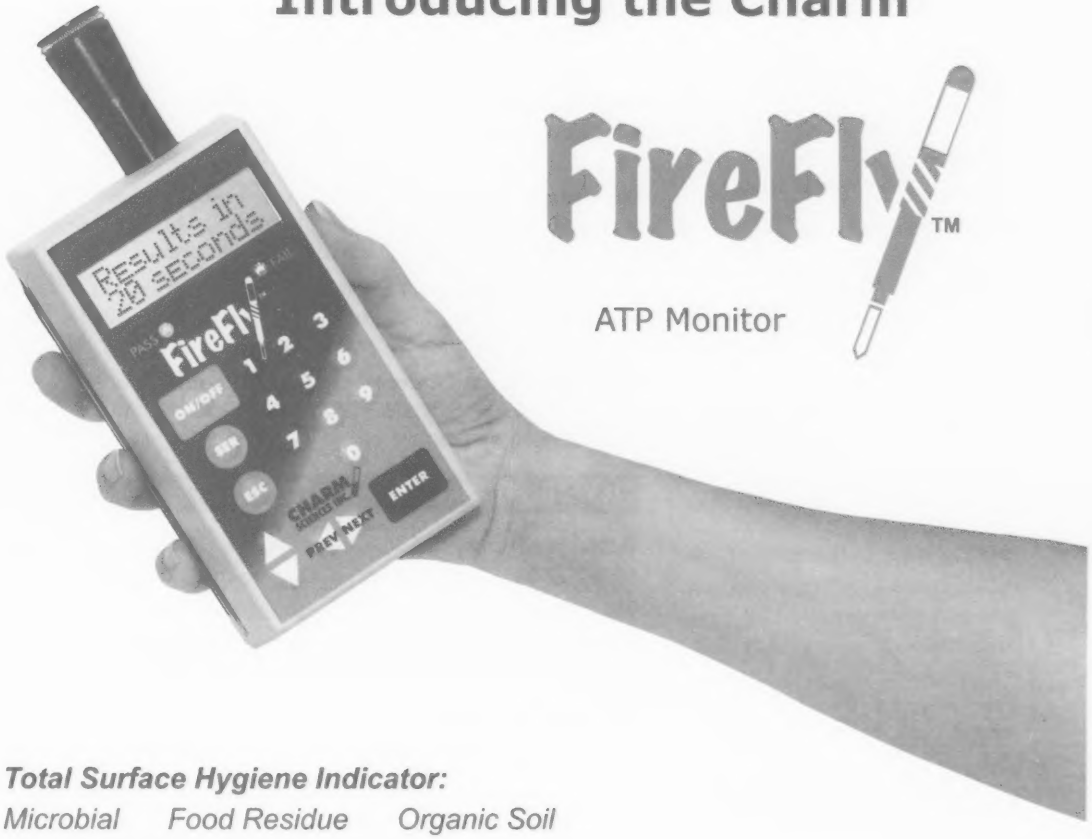

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Postcards from Iowa

By JAMES DICKSON
President

"The Foundation Fund is *your* fund, and by supporting it you are supporting IAFP"

Hello! Well, spring is in sight, although we have had a relatively mild winter this year, at least in our part of the country. As spring approaches, many of us start thinking about gardening and working outside in the yard. While those things can be chores for some, it is in many cases a welcome relief to those who have been indoors most of the winter.

This month, I would like to talk a little bit about IAFP's Foundation Fund. Many of you are aware of this fund, through Harry Haverland's gentle reminders. The silent auction has become one of the favorite non-technical events at the Annual Meeting, and the good things that are supported by the Foundation are almost too numerous to mention. The Ivan Parkin Lecture is supported by the Foundation Fund, as well as the Audiovisual Library and several other activities. Did you ever wonder what the organization would be like without those activities? Well, we would still have an opening event at the Annual Meeting, but certainly nothing like what we have now. And while it is true that not every member uses the Audiovisual Library, those that do tend to be "repeat customers".

In a very narrow sense, IAFP could get by without the Foundation Fund. We would still be in business, and we would still publish our journals. But think of what we would miss. It would be like the difference between a black and white and a color photograph. We would have the form and the substance, but none of the richness of the hue and color. The Foundation Fund adds a dimension to the Association that would be greatly missed if it weren't there.

By now, you are waiting for the sales pitch to come about donating to the Foundation Fund. And yes, it is coming. I am asking for your continued support of the Foundation Fund. Over the next few months, we will be announcing several new initiatives to strengthen the Fund. But I want you to know that the Foundation Fund is *your* fund, and by supporting it you are supporting IAFP. We would like to grow the Foundation to a point that it could support scholarships for students, and perhaps even scholarships for continuing education of our regular members. These scholarships will be the basis for helping to educate our next generation of food safety professionals, and also help our existing members continue to grow in their professional development. The Fund could also provide additional support for speakers, not only for the Annual Meeting, but for Affiliate meetings as well. The Foundation Fund really will provide the support that this organization needs to continue to grow and provide services for its current and future members.

I would like to challenge you to think about something that you could donate to the Silent Auction at IAFP 2002, either as an individual or as a group. Think of something that would represent your company or the state (or area) that you live in. These items don't have to be major donations; some of you will remember a few years ago when some of the most competitive bidding at the Silent Auction was for some Bruce Springsteen CDs. Remember, supporting the Foundation is an investment in the future of IAFP and in the future of food safety professionals everywhere.

I would like to leave you with a few final thoughts. The Foundation plays a major role in enhancing IAFP. We all should be willing to support it in some way, simply because it gives back to all of us far more than we as individuals give to it. Much like the brown spot in my yard that will be this spring's garden, with a little care and attention from all of us the Foundation Fund will provide for IAFP Members of the future.

Same time, next month.

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COMMENTARY

From the Executive Director

By DAVID W. THARP, CAE
Executive Director

"We are excited to announce the Board's approval to place the *Journal of Food Protection* online"

This month, I want to review the January Executive Board meeting and the Program Committee meeting with you. A few very important decisions were made at both meetings that may affect you as an IAFP Member. Please read on.

The highlights of the Executive Board meeting are shown on page 196 of this issue of *DFES*. In this column, I will concentrate on only a few of the points covered there. At the Board meeting, it was announced that Jim Dickson, IAFP President would serve a three-year term on the International HACCP Alliance Board of Directors. The Board discussed and accepted a proposal to begin a "Water Safety and Quality Professional Development Group" (PDG). This PDG will hold its first meeting on Sunday, June 30 at IAFP 2002 in San Diego. See page 225 if you are interested in more information about the new PDG.

We are excited to announce the Board's approval to place the *Journal of Food Protection* online. As was mentioned in the January issue, we have been working to find financially creative ways to place *JFP* online, and have now found a way that IAFP can afford! We project that the online version of *JFP* will be available sometime in April. Watch your April issue of *DFES* for more information on how to access *JFP* online.

Speaking of the *Journal of Food Protection*, we came up one submission short of receiving 500 manuscripts for publication in the year 2001. That is a new record for submissions. You may have noted the size of recent issues, October through February. They were quite large! For the 2001 volume, we published 2,148 pages in comparison to 1,800 in the 2000 volume. Almost a 20% increase in pages published! We should also point out that this was accomplished without an increase in fees to our Members.

The Executive Board discussed and agreed in principal to the formation of a new entity, 3-A Sanitary Standards, Inc. This entity will come together to manage and operate the entire 3-A Sanitary Standards process including development of, maintenance of and publishing of uniform standards and practices for the sanitary design, fabrication, installation and operation of food and dairy processing equipment and machinery. In addition to IAFP, there will be four founding member organizations including the 3-A Sanitary Standards Symbol Administrative Council, the American Dairy Products Institute (ADPI), the International Association of Food Industry Suppliers (IAFIS), and the International Dairy Foods Association (IDFA).

At the Program Committee meeting, the Committee approved 23 symposia, two lectures, six technical sessions and five poster sessions for the largest, most complete Annual Meeting program in the history of the Association! This year we experienced a 33% increase in technical abstracts submitted in comparison to last year. This is unprecedented growth, which demonstrates the extreme interest in our Annual Meeting and our Members' work. The Preliminary Program is outlined on page 215. Make your plans now to be in San Diego for IAFP 2002 – you surely won't want to miss this year's meeting!

On Friday and Saturday preceding IAFP 2002, we will offer four workshops. The workshop titles are shown on page 224. Additional information is available at the IAFP Web site and will also be available in April's issue of *DFES*.

I want to wrap up this month with announcing our Opening Session, Ivan Parkin Lecturer for IAFP 2002. Dr. Mitchell L. Cohen from the Centers for Disease Control and Prevention will deliver his presentation "Food Safety in the Time of Anthrax." We look forward to hearing Dr. Cohen's presentation and we hope that you will be in attendance at IAFP 2002, the leading food safety conference!

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Monday, July 1, 2002
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Join us for the Monday Night Social and see first hand some of the world's rarest wildlife. Dinner will be provided in a reserved area for IAFP 2002 attendees. The Zoo will remain open to you and the public until 10:00 p.m. Explore the Zoo on a three-mile guided double-deck bus tour or go on your own adventure.

Get your ticket today!

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Dairy, Food and Environmental Sanitation, Vol. 22, No. 3, Pages 178-183
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Milk Production and Mastitis on Midwestern Organic Dairy Farms

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SUMMARY

Organic dairy farms in and around Wisconsin (n=101) were contacted in July 1999 with a one-page questionnaire. A total of 69 responses were sufficiently complete for analysis. Herd size averaged 61.3 cows. Mean milk production was estimated as 17.2 kg per cow per day, which is less than the Wisconsin state average of 20.73 kg per cow per day. The average bulk tank somatic cell count was 329,000 cells per ml, which was almost identical to the Wisconsin average of 335,000 cells per ml. The overall rate of mastitis was 42 cases per 100 cow years-at-risk, which is within the range of rates reported in the literature. The cull rate based on July 1999 figures was 25% per year, which is low-normal for the Midwestern dairy industry. Only 16% of responding organic farms usually used homeopathic remedies, and 50% of farms never used homeopathic remedies. This preliminary survey suggested that the responding organic herds had herd size, mastitis rate and SCC similiar to those of conventional herds in the same geographic area. In contrast, their milk production and culling rates were lower for the organic herds than for most conventional herds.

INTRODUCTION

Organic dairy production is drawing increasing attention because of public concerns about food safety, animal welfare and the environmental impacts of intensive livestock systems (*22*). Though the United States organic food market is approximately $6 billion, which is less than 1% of total food consumption in the USA, the organic market has been growing at 20-30 percent per year (*13*). In contrast, the organic milk market in Denmark is approximately 14% of the total milk consumption (*16*). More than 25% of total sales of dairy products in Switzerland is labeled as organic (*11*). In the United Kingdom, a 30 to 40% per annum increase of organic products has been observed (*21*). Organic agriculture is being recognized by governmental bodies as a tool to improve rural income diversity and stability (*2*).

A peer-reviewed article.

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Figure 1. Frequency distribution on number of lactating cows in July 1999

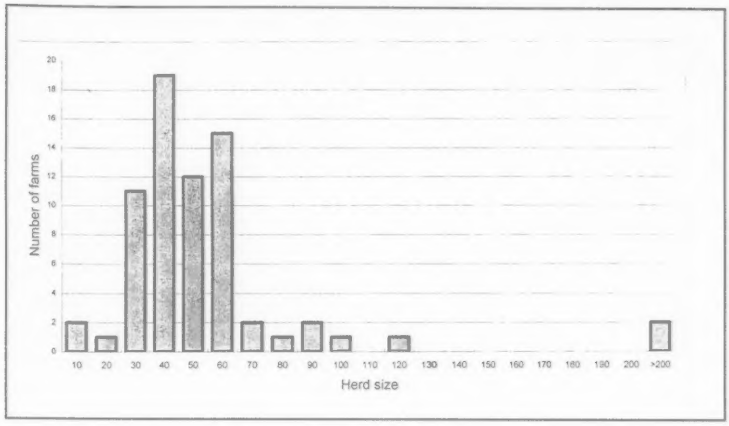
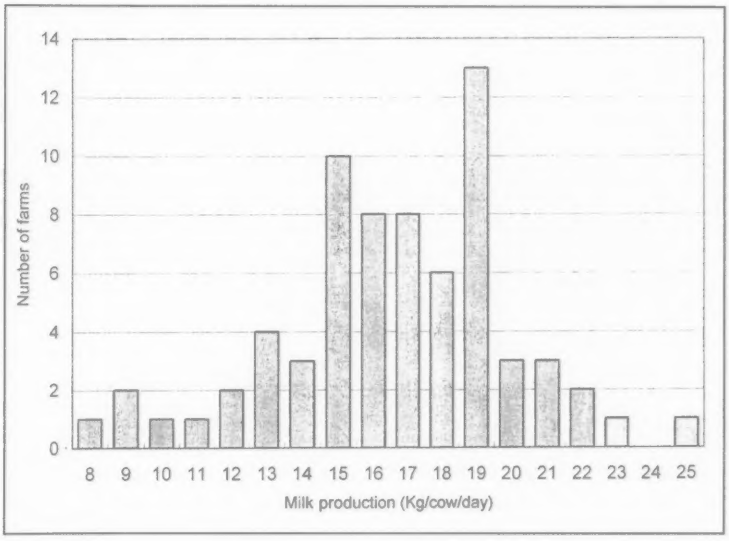


Figure 2. Frequency distribution of average milk production per cow per day



The definition of "organic" has varied from country to country and among United States certifying organizations, causing consumer confusion. At present, farms are certified as organic dairies by independent certifying organizations based on their own standards. The USDA has attempted to establish federal standards since 1990, and a revised National Organic Standard was recently published in the Federal Register (*3*). Organic dairies must use organic feedstuffs, which are grown without any chemically synthesized fertilizer, herbicides or insecticides. The use of antibiotics for therapy or prophylaxis and hormones for growth promotion or production enhancement are prohibited. Since many conventional veterinary prophylactic and therapeutic medicines are not permitted, organic dairy farmers have adopted a variety of management practices to prevent clinical disease.

It has been reported that organic dairies had higher culling rates, primarily due to the development of udder infections and reproductive problems (*1*). However, Wellers et al. (*21*) reported that the rate of clinical mastitis in 10 organic dairies in the United Kingdom was not significantly different from the rate in conventional dairies. Busato et al. (*11*) reported the prevalence of subclinical mastitis in organic dairies in Switzerland to be lower than the national average.

The purpose of this survey was to determine if herd size, milk production, mastitis incidence, somatic cell count (SCC), and culling rate of organic dairy farms differ from values reported for conventional dairy farms in the same region.

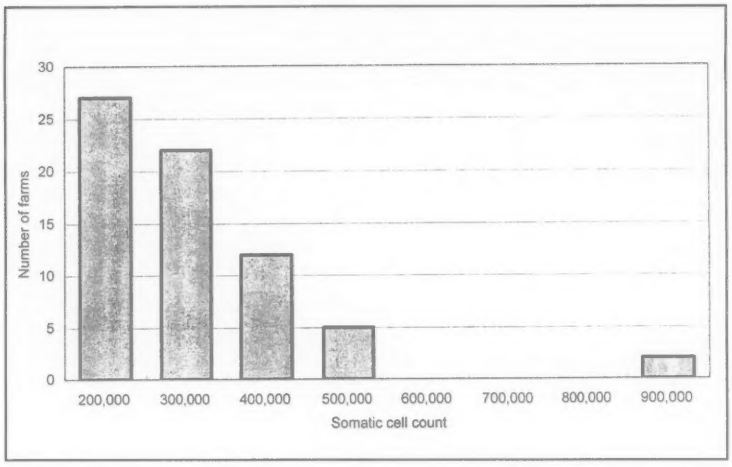
MATERIALS AND METHODS

In August 1999, a one-page questionnaire regarding milk production, animal movement and mastitis was mailed to 101 dairies (80 in Wisconsin, 13 in Minnesota, seven in Iowa and one in Illinois). Non-responders received a second questionnaire six weeks later. Wisconsin state averages were used as comparison data. Statistical analysis was performed using Excel. A Z test was used to test the hypothesis that the organic farms did not differ from the Wisconsin state average for milk production and herd size.

RESULTS

A total of 73 responses were received, four of which were excluded because of missing data. There were 3,581 cows contributing bulk tank milk on responding farms in July 1999. Based on an assumed 13-month calving interval and two-month dry period (*5*), the total number of milking cows (cows that have had at least one calf) was estimated at 4,232, or 61.3 head per farm. Only three farms had more than 100 milking cows, and two had less than 20 (Fig. 1). In 1999, the average number of milking cows per farm was 62.3 and 82.1 for dairy herds in Wisconsin and in the United States, respectively (*7*). Therefore, the organic farms we studied had about the same herd

Figure 3. Frequency distribution on bulk tank SCC in July 1999



size as the average dairy farm in Wisconsin ($P = 0.87$); however, they were much smaller than the United States average ($P = 0.0011$).

The amount of bulk tank milk produced per day per cow in the 69 organic dairy farms was 17.16 kg (75.6 metric ton / 4,232 cows), which was lower than the Wisconsin state average of 20.73 kg ($P = 0.001$) (*8*). There was considerable variation in reported milk yield; herd average milk production per cow ranged from 8.5 Kg to 25.6 Kg (Fig. 2). Herd bulk tank SCC averaged 329,000 cells/ml of milk. The lowest SCC was 104,000 cells/ml and the highest SCC was 935,000 cells/ml. Two farms reported SCC >900,000 cells/ml during single month, and five farms had approximately 500,000 cells/ml (Fig. 3). The mean bulk tank SCC in Wisconsin for 1995 to 1998 was 335,000 cells/ml for grade A herd and 480,000 cells/ml for grade B herd (*20*); SCC values for responding organic herds approximated the mean reported values for all Wisconsin dairy herds.

The producers were asked to recall the number of mastitis cases in the "last month" (July 1999) and also the number of mastitis cases in the "last year" (June 1998 – July 1999). Clinical mastitis was defined in this questionnaire as "a period of disease when a cow has noticeable clots or strings in its milk". When based on "last month", the mastitis rate was estimated at 42.4 cases per 100 cow years at risk, but when based on "last year", the mastitis rate was only 17.7 cases per 100 cow-years at risk.

When the organic producers found mastitic quarters, 72% usually treated the quarter by keeping it milked out. Sixty-two percent of responding farms usually massaged the mastitic quarter, but 22 producers (33%) occasionally massaged the quarter, and three farms (5%) never massaged the quarter. Sixty-three percent of producers usually or sometimes used vitamins, but 36% of producers never used vitamins for mastitis treatment. Whey colostrum products for mastitis treatment were usually used by 28% of producers; 29% sometimes used whey products, and 43% of producers never used these products. Sixty-four percent of producers had never used any udder infusions for mastitis treatment, but 36% of producers occasionally used various kinds of non-antibiotic udder infusions, such as aloe products. Only 16% usually used homeopathic remedies, 34% sometimes used homeopathic remedies, and half (50%) of the organic farms never used homeopathic remedies for mastitis.

Sixty-nine responding organic producers reported the number of cows sold for slaughter in the month of July 1999 and between June 1998 and July 1999. The total number of milking-age cows sold for slaughter were 88 in July 1999 and 795 in the previous year. The cull rate was therefore 25.0% (88/4232*12) and 18.8% (795/4232) for July 1999 and for the previous year, respectively.

Four organic producers reported selling a total of 13 milking-age cows to other organic dairy farms during 12 months in 1998. Eight organic producers sold a total of 32 cows to conventional dairy farms in 1998. Five organic dairy producers treated a total of nine organic cows with antibiotics and sold them to conventional farms.

Organic producers reported that 15 cows died in the month of July 1999, and 92 died in the previous year. Fifty-four producers reported no dead cattle in July 1999, and 19 reported no death in the previous year. The mortality rate was estimated at 4.3% (15*12/4232) based on "last month" and 2.2% (92/4232) based on the "previous year".

DISCUSSION

The data for this study were from the membership of one particular organic dairy cooperative in Wisconsin and surrounding states. Therefore, the results of this analysis may not be applicable to other organic dairy organizations. The response to our questionnaire was moderately high (72%). However, non-respondents may have differed from respondents in their management and production parameters (*10*). Although defined on the survey form, the definition of clinical mastitis is subjective and open to interpretation, and reporting bias may therefore have occurred.

Our study found that organic dairy farms were about the same size as other farms in the region. Ogini et al. (*17*) studied six organic dairies in Ontario and found that

TABLE 1. Estimated production parameters, based on a presumable calving interval of 13 months and two-month dry period with available Wisconsin state averages. The Wisconsin state average was extracted from USDA-NASS Agricultural Statistics 2000 *(7)* and SCC from Ruegg et al *(20)*.

	Organic farms (n=69)		Wisconsin state average
Number of cattle per herd	61.3		62.3
Milk production per cow (Kg per day)	17.8		20.3
SCC (cells/ml)	329,000		328,000-335,000
	(Based on last month)	(based on last year)	
Mastitis (case/100 cow-year)	42.4	17.7	Not Available
Culling rate (%)	25.0	18.8	Not Available
Mortality rate (%)	4.3	2.2	Not Available

organic dairy producers had tillable land base and herd size (48 cows per herd) comparable to those of conventional dairies. The study in Switzerland indicated the organic herd size was equal to the national average (*11*). Herd size may be determined by regional conditions rather than the type of dairy husbandry. Though the organic dairies in our study were much smaller than the United States average, this does not imply that larger organic dairy operations are impractical; large organic dairy operations can be found in other parts of the United States (*4*).

The mean milk production reported by the organic dairy farms was lower than the Wisconsin state average. Lower milk production per cow when compared to the conventional dairies in the same region is supported by results of other studies (*11, 15, 19*). Lower milk yield per cow is likely attributable to more pasture and less grain being used for organic dairy production (*15*). Grazing farms usually produce less milk per cow than do nongrazing farms (*14*).

The rate of clinical mastitis based on data from July 1999 was slightly higher than rates reported from other regions (*10, 21*); however, the results based on data from the previous year were lower than what has been reported for other regions. The mastitis rates from other populations are difficult to compare because of the regional differences, poor standardization of case definition and high variance in diagnostic acumen among the studies (*9*). The mastitis rate, based on July data, may be higher than the rate based on the "previous year" because the more recently occurring cases were more easily recalled (recall bias). Also, mastitis incidence is usually highest in July and August (*12*). In and around Wisconsin, July 1999 had record breaking heat. Therefore, the mastitis rate may be overestimated when the July rate is extrapolated to a whole year.

The bulk tank SCC average of the 69 organic dairies, based on July, was within the range of the Wisconsin state average. The SCC data for the organic herds may be overestimated because it was based on the month of a year (July) which has been reported to have the highest SCC (*6, 12*). Although Weller et al. (*23*) in a six-year longitudinal study, reported a higher SCC in one organic herd than in conventional herds, other studies have reported lower SCC in organic herds than in conventional herds (*11*). The SCC data reported here suggested that responding organic dairies may have lower average bulk tank SCC than do most conventional dairies.

Radke et al. (*18*) reported that culling rates are difficult to compare because of different definitions of culling. The culling rate in our study was defined as number of cows culled per year divided by the average milking herd size. The culling rate in the reports of the Dairy Herd Improvement Associations (DHIA) includes the average herd size plus the number of animals culled in the denominator (*18*), so the rates become lower than they would be using our definition. The statewide DHIA culling rate of Holstein cattle in Wisconsin was reported as 37.6% (AgSource CRI, personal communication). Therefore, the estimated culling rate of the organic dairies was considerably lower than the Wisconsin average. The estimated culling rate

APPENDIX 1.

Initial Survey – August 1999

How many cows are now contributing milk to your bulk tank? _____

How many years has your dairy farm been organic? _____years

If a "case" of mastitis is defined as a period of disease when a cow has noticeable clots or strings in its milk, about how many cases of mastitis have you had in:

the past week? _____ the past month? _____ the past year? _____

About how many milking-age cows:

	last month?	last year?
died	_____	_____
were sold for slaughter	_____	_____
were sold to an organic farm	_____	_____
received antibiotics and were sold to a non-organic farm	_____	_____
were NOT treated, but were sold to a non-organic dairy farm	_____	_____
Other _____	_____	_____

Please indicate how you usually treat your routine cases of clinical mastitis in which the cow's milk has clots or strings, but the cow is not sick.

	Circle one		
Keep the quarter milked out.	usually	sometimes	never
Massage the quarter.	usually	sometimes	never
Use vitamins (B, C, etc.).	usually	sometimes	never
Use Impro (or similar whey colostrum product).	usually	sometimes	never
Use other udder infusions (describe type).	usually	sometimes	never
Other	usually	sometimes	never

in the organic dairies based on "last month" was almost identical to the national average of 25.0% (5), but the 18.8% estimate based on "last year" was lower than the national average. Recall bias in failing to remember animals culled 2 to 12 months ago may have caused some of the difference between our two rates estimates. Also important is the previously discussed issues of extrapolating data from a particularly hot month of July to an annual rate. Reksen et al. (*19*) reported a significant difference between organic and conventional dairy farms in annual replacement. Norwegian organic dairies had a 23% cull rate, whereas conventional dairies had a 35% cull rate, which resulted in more multiparous cows in organic dairies than in conventional dairy farms. Because a culling rate of 20 to 30% optimizes producer profit (*18*), the culling rate in the organic dairies (18.8 to 25.0%) may be economically optimized.

These preliminary results suggest that organic Midwestern dairy farms have lower or at most similar rates of bulk tank SCC and mastitis, compared with conventional dairy farms in the same region. Lower milk yield per cow may reduce stress on the udder, causing a lower mastitis rate in organic dairies. Culling rates appeared to be lower, or at most similar, in the organic herds, compared with state and national averages. Homeopathic remedies were not widely used by the organic farms, and there was little movement of sick cows from organic to conventional farms.

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CALL FOR PAPERS

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Contact: Conference Coordinator G&L AgriTec by phone, mail or E-mail at 559.561.0112; 43857 S. Fork Dr., Three Rivers, CA 93271; or confcoordozone3@earthlink.net. Ozone III and CSUF Ozone Research information at www.cati.csufresno.edu/ozone.

Dairy, Food and Environmental Sanitation, Vol. 22, No. 3, Pages 184-190
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Application of a Commercial Steam Vacuum Unit to Reduce Inoculated *Salmonella* on Chilled Fresh Beef Adipose Tissue

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SUMMARY

This study evaluated the efficacy of a commercial steam vacuum unit in reducing *Salmonella* populations on inoculated, chilled beef carcass adipose tissue. Beef carcass tissue samples (N=70) were separated into four treatment groups: (1) uninoculated, without post-chilling steam vacuum application; (2) uninoculated, with post-chilling steam vacuum application; (3) inoculated pre-chilling, without post-chilling steam vacuum application; and (4) inoculated pre-chilling, with post-chilling steam vacuum application. Following inoculation (5.2 log CFU/cm^2), chilling (24 h; 2.6°C), and post-chilling steam vacuum application (1.72 bar steam; 130°C; -0.24 bar vacuum), if required by the assigned treatment, samples were sponge swabbed and excised for microbiological analysis. Despite previous sponge swabbing of the same area, excision proved to be the most effective sampling method to recover and subsequently enumerate bacteria. Inoculated *Salmonella* were reduced ($P < 0.05$) to populations of 3.2 to 3.6 log colony-forming-units (CFU)/cm^2 by steam vacuum application, compared with populations of 3.9 to 4.1 log CFU/cm^2 for inoculated, untreated control samples. Results indicated that, under the conditions of this study and for the inoculum levels tested, steam vacuuming did not achieve reductions of sufficient magnitude (> 1.0 log CFU/cm^2) to support its use in decontaminating chilled beef tissue. The lack of efficacy of steam vacuuming in this study may have resulted from too rapid movement of the unit across the surface of the adipose tissue. Although the manner of application closely simulated use of the device in commercial practice, duration of contact of steam with bacterial cells that were attached, imbedded or protected by biofilm may have been insufficient to kill them.

A peer-reviewed article.

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International Association for Food Protection

INTRODUCTION

The process known as "steam vacuuming" involves application of hot water, steam, or a combination of hot water and steam, followed by the vacuum uptake of condensate and associated contamination (*21*). In April 1996, the application of steam vacuuming was approved by the Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) as an alternative to knife-trimming for removing feces, ingesta, and other contamination from carcasses, provided that the spot of visible contamination does not exceed 2.5 cm in diameter (*10, 11, 21*). The application of steam vacuuming has been found to be at least as effective as knife-trimming and more consistent in effectiveness than water washing for the purpose of spot carcass cleaning/decontamination (*6, 18*).

Two steam/hot water vacuum systems were evaluated (*18*) for their efficacy as decontamination treatments when applied to beef carcass surfaces at ≥ 82°C, 0.34 to 1.03 bar, with condensate subsequently removed at –0.0093 bar. The application of steam/hot water vacuuming before carcass splitting reduced aerobic plate counts (APC) and total coliform counts (TCC) by 1.1 to 2.3 and 1.2 to 2.2 log CFU/cm², respectively, from initial populations of 4.6 to 5.1 and 2.9 to 3.2 log CFU/cm² (*18*).

In another study (*6*), steam vacuuming significantly reduced APC, TCC and *Escherichia coli* counts (ECC) on inoculated beef carcass short plates, following an incubation time of 15 min at room temperature, from initial populations of 6.2, 5.0 and 4.8 log CFU/cm², respectively, to 3.2, 1.0 and 0.8 log CFU/cm². In a subsequent study (5), steam vacuuming resulted in 2.0 to 3.0 log CFU/cm² reductions in APC and a 5.5 log CFU/cm² reduction in *E. coli* O157:H7 populations when beef short plates were inoculated with 5.5 and 7.6 log CFU/cm², respectively, and allowed to incubate at room temperature for 15 min.

A 1997 study (*7*) demonstrated that, following inoculation of beef short plates and a subsequent incubation 15-min period at room temperature, use of steam vacuuming initially resulted in reductions of 1.6 to 3.0 log CFU/cm² of *Listeria innocua*, APC, lactic acid bacteria, *E. coli* O157:H7 and *Clostridium sporogenes* populations. However, following the initial treatment, *L. innocua*, APC and lactic acid bacteria began to grow within 2 days of refrigerated storage and reached populations of at least 7.0 log CFU/cm² by 7 days of storage. Nevertheless, *E. coli* O157:H7 and *C. sporogenes* counts (log CFU/cm²) were reduced by 1.4 and 4.4, respectively, through 21 days of cold storage (*7*).

Studies evaluating the efficacy of steam/hot water vacuuming, solely or in combination with other decontamination treatments, have generally concluded that use of the technology effectively reduces bacterial populations on fresh beef carcass surfaces. However, little information is available regarding the efficacy of this technology when applied to beef carcass surfaces following chilling. Decontamination of chilled carcass surfaces could further improve end-product microbiological quality by inactivating bacteria that survive the chilling process or by reducing contamination that occurs during shipment of carcasses to other facilities for subsequent fabrication. The objective of this study was to simulate post-dehiding carcass surface contamination with *Salmonella* and to determine if steam vacuuming was an effective means of decontamination when applied following a period of chilling sufficient to allow adequate time for bacterial attachment, penetration, and/or biofilm formation.

MATERIALS AND METHODS

Beef carcass tissue. Samples (N = 70) of adipose tissue (300 to 400 cm²) were excised from the brisket and rib regions of beef carcasses at a commercial slaughtering facility. Following sample collection, which occurred after the slaughtering/dressing process but immediately before carcass chilling, the excised tissue was placed into coolers and transported (approximately 50 km, in about 45 min) to Colorado State University. Tissue samples were placed onto trays and separated into four treatment groups: (1) uninoculated, without post-chilling steam vacuum application (n = 10); (2) uninoculated, with post-chilling steam vacuum application (n = 10); (3) inoculated, without post-chilling steam vacuum application (n = 10); and (4) inoculated, with post-chilling steam vacuum application (n = 40). Treatment 3, an inoculated, untreated control, was subsequently compared to treatment 4 for determination of the efficacy of steam vacuuming in reducing inoculated *Salmonella* populations. The uninoculated controls, without (Treatment 1) and with post-chilling steam vacuum application (Treatment 2), were used to estimate background interference by determining commensal bacterial population levels and their ability to resist the antibacterial effects of streptomycin, as well as determining the efficacy of steam vacuuming in reducing such populations on beef adipose tissue.

Inoculum. A *Salmonella* spp. isolate, confirmed by biochemical testing (API 20E test strip, bioMérieux, Hazelwood, MO), was used to inoculate samples in Treatments 3 (inoculated, without post-chilling steam vacuum application) and 4 (inoculated, with post-chilling steam vacuum application). The isolate was recovered from a beef cattle hide that was sampled after animal stunning and exsanguination, but before hide opening and subsequent hide removal, at a commercial slaughtering facility. The *Salmonella* spp. isolate demonstrated a natural ability to resist the antimicrobial effects of streptomycin at a concentration of > 600

µg/ml and was subsequently maintained on tryptic soy agar (TSA) slants (Difco Laboratories, Detroit, MI) at 4°C for use during this study. The working stock culture was subcultured overnight (18 h), twice in tryptic soy broth containing streptomycin (600 µg/ml; Difco Laboratories) at 37°C, at which time stationary phase cells were diluted (approximately 7.2×10^6 CFU/ml) using sterile, 0.1% buffered peptone water (Difco Laboratories). Immediately before inoculation of the adipose tissue samples, a sterile, 100 cm^2 disposable template (USDA Template, International BioProducts, Redmond, WA) was placed onto the adipose tissue and the outer perimeter was traced with a scalpel to make possible sampling of the enclosed inoculated area following chilling. Adipose tissue samples were inoculated with 2 ml of inoculum (approximately 7.2×10^6 CFU/ml), resulting in the application of 1.44×10^7 cells, which were uniformly spread over the 100 cm^2 (1.44×10^5 CFU/cm^2; 5.2 log CFU/cm^2) surface with a sterile glass rod. This recognizably high level of *Salmonella* was used in order to accurately quantify treatment differences following chilling. Inoculated and uninoculated samples were chilled for 24 ± 2 h at 2.6°C to simulate approximate commercial slaughter plant initial chilling temperatures and times.

Steam Vacuum Application. Following chilling (24 ± 2 h; 2.6°C), a two-drop, commercial steam vacuuming system (BFD Corporation, Aurora, CO) was used to decontaminate Treatment 2 samples (uninoculated, with steam vacuum application) and Treatment 4 samples (inoculated, with steam vacuum application). Steam (1.72 bar; 130°C) was applied to the chilled adipose tissue in four vertical passes of the hand-held application nozzle, with a manner of application that closely simulated use of the device in commercial practice. The subsequent condensate was vacuumed away (-0.24 bar) and collected in a 33.1 liter receiving tank. Sterile gloves (International BioProducts) were used to handle each individual sample; following steam vacuum application, gloves were changed in order to reduce the opportunity for cross-contamination between samples.

Microbiological analysis. Sponge and excision sampling methods were used for enumeration of bacteria on inoculated and uninoculated tissue samples. Immediately before sampling, sterile sponges (BioPro Enviro-Sponge Bags, International BioProducts) were hydrated with 10 ml of sterile, 0.1% buffered peptone water (BioPro, International BioProducts). Sponge sampling of each tissue sample occurred within a 100 cm^2 disposable, sterile template (USDA Template, International BioProducts) and consisted of 10 passes vertically (up-and-down being considered as 1 pass) and 10 passes horizontally (side-to-side being considered as 1 pass) with a pressure equivalent to that which would be used to remove dried blood, as described in the FSIS-USDA Meat and Poultry Inspection regulations (*12*). Swabbing with sponges was performed aseptically using sterile latex gloves (International BioProducts), which, like the templates, were changed between samples. Following sponging, an additional 15 ml of sterile, 0.1% buffered peptone water (Difco Laboratories) was added to the sponge bag, bringing the total volume of buffer to 25 ml.

Previously sponged tissue was then aseptically excised using a sterile scalpel blade and forceps. Excision was performed using a sterile 100 cm^2 template (USDA Template, International BioProducts) which, like the scalpel blade and forceps, were changed between samples. The excised tissue (10 cm × 10 cm, < 0.5 cm thick) was placed into a sample bag where it was weighed and diluted (10^{-1}) using sterile 0.1% buffered peptone water (Difco Laboratories). The previously sponged tissue was excised and evaluated to determine the microbiological population remaining on the 100 cm^2 surface, inasmuch as the time (24 ± 2 h) between inoculation and sampling, even at refrigerated temperatures, may have allowed for increased attachment and tissue penetration of the microorganisms, thereby reducing enumeration accuracy of the sponge sampling method.

Following tissue sampling, sponge and excision samples were individually agitated in a stomacher (Masticator, IUL Instruments, Barcelona, Spain) for one minute, and serial dilutions were made using sterile, 0.1% buffered peptone water (Difco Laboratories). For each dilution tested, an aliquot (0.1 ml) of diluent was dispensed and uniformly spread with a sterile glass rod onto plates of TSA, xylose lysine tergitol 4 (XLT_4) agar, TSA containing streptomycin at a concentration of 600 µg/ml (TSA + streptomycin), and XLT_4 containing streptomycin at a concentration of 600 µg/ml (XLT_4 + streptomycin) (Difco Laboratories). The plates were inverted and incubated for 24 ± 2 h at 35°C, at which point they were removed from the incubator, and colonies were manually counted using a Quebec Darkfield Counter (AO Scientific Instruments, Buffalo, NY). Enumeration on TSA was used to determine the collective aerobic bacterial population, regardless of streptomycin susceptibility. Conversely, XLT_4 agar, a selective medium, was used to enumerate all *Salmonella* regardless of streptomycin susceptibility. Enumeration on TSA + streptomycin was used to determine the extent of streptomycin resistance within the aerobic bacterial population, while XLT_4 + streptomycin was used to enumerate streptomycin-resistant *Salmonella* only.

Statistical Analysis. After enumeration of colonies associated with the sponge sampling method and initial reporting of the data as CFU/ml of diluent plated, each count was multiplied by 25 (the total volume in ml of buffer used) and divided by 100 (the total surface area in cm^2 swabbed) to express

TABLE 1. Least squares means ($\bar{x}$) and standard deviations (s) of the log values for plate counts (CFU/cm²), and the number of samples (n*) taken in which bacterial populations were too numerous to count (TNTC[a]) following recovery on tryptic soy agar (TSA)

	Method of Sampling								
	Sponging[b]				Excision[b]			Sponging + Excision	
Treatment	n[c]	$\bar{x}$	s	n*	$\bar{x}$	s	n*	$\bar{x}$	s
Uninoculated	10	3.4	0.38	1	4.7	0.06	10	4.7	0.05
Uninoculated + Steam Vacuum	10	3.8	0.07	8	4.6	0.04	8	4.7	0.03
Inoculated	10	4.1[z]	0.95	0	5.4[z]	0.37	0	5.5	0.41
Inoculated + Steam Vacuum	40	4.1[z]	0.64	0	4.9[y]	0.45	0	5.0	0.46

[a]Uninoculated sponge samples were TNTC above 3.8 log CFU/cm², while inoculated sponge samples were TNTC above 5.8 log CFU/cm², uninoculated excision samples were TNTC above approximately 4.7 log CFU/cm², while inoculated excision samples were TNTC above approximately 5.7 log CFU/cm².

[b]Based on repeated measures ANOVA, excision resulted in greater ($P < 0.05$) bacterial enumeration than the sponge sampling method.

[c]Number of samples (n) analyzed for each treatment.

[y,z]Means in the same column with different superscript letters are different ($P < 0.05$).

counts as CFU/cm². Similarly, after enumeration of colonies associated with the excision sampling method and initial reporting of the data as CFU/ml of sample analyzed, each count was multiplied by the total volume of buffer used (excised sample weight diluted 10^{-1}) and divided by 100 (total surface area in cm² excised) to express counts as CFU/cm². In addition to individual analysis, bacterial populations (CFU/cm²) derived from sponge and excision sampling data for each sample were combined (sum of sampling counts) to assay the total number of cells present before any sampling occurred. The sponge, excision and combination counts (CFU/cm²) were transformed to $\log_{10}$ CFU/cm² for statistical analyses. Minimum detection limits of counts for sponge sampling, excision sampling, and the combination of sponge and excision sampling were 0.4, approximately 1.2, and approximately 1.3 log CFU/cm², respectively, based on maximum sensitivity with no further sample dilution beyond the original buffer volume for sponge swabs (25 ml) or excised tissue (excised sample weight diluted 10^{-1}). Sponge and excision counts falling below the minimum detection limit were entered as 0.4 and 1.2 log CFU/cm², respectively, so that statistical analyses could be performed. Values for the mean plate count ($\bar{x}$) and standard deviation (s) of each enumerated set ($\log_{10}$ CFU/cm²) were calculated on the assumption of a log-normal distribution of microorganisms (*2, 13, 15, 17*).

For each recovery media—TSA, XLT_4, TSA + streptomycin and XLT_4 + streptomycin—data were evaluated with repeated measures analysis of variance (AOV) using the model $y = a + \times_1 + \times_2 + \times_1\times_2$ and least-squares means were computed for bacterial populations for the fixed effects of treatment ($\times_1$; 1 = uninoculated, without post-chilling steam vacuum application; 2 = uninoculated, with post-chilling steam vacuum application; 3 = inoculated, without post-chilling steam vacuum application; and, 4 = inoculated, with post-chilling steam vacuum application), sampling method ($\times_2$; sponge swabbing and tissue excision), and treatment × sampling method ($\times_1\times_2$), using the Mixed Models procedure of SAS® (*19*). In most cases, uninoculated treatments (1 and 2) resulted in bacterial populations near the detection limit; therefore, they were removed due to heterogeneity of variance when compared to the inoculated treatments (3 and 4). Because of significant treatment × sampling method interaction for each of the recovery media (TSA: p = 0.0134; XLT_4: p = 0.0021; TSA + streptomycin: p = 0.0249; XLT_4: p = 0.0019), only interaction subclass least-squares means are reported. When AOV detected effects ($P < 0.05$), least-squares means were separated using the pairwise t-test of SAS® (*19*). However, because of interaction and variance that depended on treatment, treatment comparisons were made using the pairwise t-test modified for unequal variance (Satterthwaite degrees of freedom).

RESULTS AND DISCUSSION

No differences were observed ($P > 0.05$) between untreated and treated inoculated tissues with regard to bacterial counts of samples obtained by sponging following enumeration on TSA, XLT_4, TSA + streptomycin, or XLT_4 + streptomycin (Tables 1-4). However, enumeration of excised samples (untreated vs. treated inoculated tissues) reflected reductions ($P < 0.05$) in bacterial populations of 0.5, 0.5, 0.6 and 0.8 log CFU/cm² for TSA, XLT_4, TSA + streptomycin, and XLT_4 + streptomycin, respectively, follow-

TABLE 2. Least squares means ($\bar{x}$) and standard deviations (s) of the log values for plate counts (CFU/cm²), and the number of samples (n⁻) in which bacterial populations were not detected (ND[a]) following recovery on xylose lysine tergitol 4 (XLT_4) agar

	Method of Sampling								
	Sponging[b]				Excision[b]			Sponging + Excision	
Treatment	n[c]	$\bar{x}$	s	n⁻	$\bar{x}$	s	n⁻	$\bar{x}$	s
Uninoculated	10	0.9	0.61	2	3.3	0.76	0	3.3	0.75
Uninoculated + Steam Vacuum	10	1.4	0.61	0	3.3	0.65	0	3.3	0.65
Inoculated	10	2.6[z]	0.63	0	4.1[z]	0.52	0	4.2	0.52
Inoculated + Steam Vacuum	40	2.4[z]	0.51	0	3.6[y]	0.62	0	3.6	0.59

[a]Counts were not detected (ND) at detection limits of 0.4 and approximately 1.2 log CFU/cm² for sponging and excision sampling methods, respectively.

[b]Based on repeated measures ANOVA, excision resulted in greater ($P < 0.05$) bacterial enumeration than the sponge sampling method.

[c]Number of samples (n) anlayzed for each treatment.

[y,z]Means in the same column with different superscript letters are different ($P < 0.05$).

TABLE 3. Least squares means ($\bar{x}$) and standard deviations (s) of the log values for *Salmonella* counts (CFU/cm²), and the number of samples (n⁻) in which *Salmonella* counts were not detected (ND[a]), following recovery on tryptic soy agar containing streptomycin at a concentration of 600 μg ml (TSA + Streptomycin)

	Method of Sampling								
	Sponging[b]				Excision[b]			Sponging + Excision	
Treatment	n[c]	$\bar{x}$	s	n⁻	$\bar{x}$	s	n⁻	$\bar{x}$	s
Uninoculated	10	0.5	0.19	2	1.4	0.17	4	1.4	0.15
Uninoculated + Steam Vacuum	10	0.6	0.30	3	1.3	0.14	5	1.4	0.15
Inoculated	10	3.0[z]	0.57	0	4.1[z]	0.26	0	4.1	0.27
Inoculated + Steam Vacuum	40	2.7[z]	0.33	0	3.5[y]	0.45	0	3.6	0.39

[a]Counts were not detected (ND) at detection limits of 0.4 and approximately 1.2 log CFU/cm² for sponging and excision sampling methods, respectively.

[b]Based on repeated measures ANOVA, excision resulted in greater ($P < 0.05$) bacterial enumeration than the sponge sampling method.

[c]Number of samples (n) anlayzed for each treatment.

[y,z]Means in the same column with different superscript letters are different ($P < 0.05$).

ing the application of steam vacuuming (Tables 1-4).

There was little evidence of background growth and consequently no interference on media containing streptomycin (TSA + streptomycin; XLT_4 + streptomycin), regardless of sampling method, as uninoculated samples produced detectable bacterial populations close to the detection limits (Tables 3 and 4). In contrast, recovery on TSA and XLT_4 resulted in average counts of 4.7 and 3.3 log CFU/cm², respectively, for the uninoculated without post-chilling steam vacuum application treatment, and corresponding counts of 4.7 and 3.3 log CFU/cm², respectively, for the uninoculated with post-chilling steam vacuum treatment (Tables 1 and 2).

Sponge sampling results of the uninoculated treatments, following

TABLE 4. Least squares means ($\bar{x}$) and standard deviations (s) of the log values for *Salmonella* counts (CFU/cm²), and the number of samples (n^-) in which *Salmonella* counts were not detected (ND[a]), following recovery on xylose lysine tergitol 4 agar containing streptomycin at a concentration of 600 μg ml (XLT_4 + Streptomycin)

	Method of Sampling								
	Sponging[b]			Excision[b]			Sponging + Excision		
Treatment	n^c	$\bar{x}$	s	n^-	$\bar{x}$	s	n^-	$\bar{x}$	s
Uninoculated	10	0.4	0.00	10	1.2	0.06	10	1.3	0.05
Uninoculated + Steam Vacuum	10	0.4	0.00	10	1.2	0.05	9	1.3	0.05
Inoculated	10	2.6[z]	0.66	0	3.9[z]	0.33	0	3.9	0.34
Inoculated + Steam Vacuum	40	2.3[z]	0.40	0	3.1[y]	0.46	0	3.2	0.42

[a]Counts were not detected (ND) at detection limits of 0.4 and approximately 1.2 log CFU/cm² for sponging and excision sampling methods, respectively.

[b]Based on repeated measures ANOVA, excision resulted in greater ($P < 0.05$) bacterial enumeration than the sponge sampling method.

[c]Number of samples (n) anlayzed for each treatment.

[y-z]Means in the same column with different superscript letters are different ($P < 0.05$).

recovery on TSA and XLT_4, suggest an increase in bacterial populations following steam vacuum application. While this trend was not seen in larger bacterial populations associated with the inoculated treatments, steam vacuum application may have facilitated bacterial cell deattachment and subsequent removal during sponge swabbing. Nonetheless, no differences were observed between uninoculated treatment means following tissue excision or when bacterial populations obtained by use of both sampling methods were combined (Tables 1-4).

Overall, sponge sampling was inferior to the excision sampling method in recovering and accurately enumerating bacterial populations following chilling. The excision sampling method detected differences in inoculated tissue treatments that were not reflected when the sponge sampling method was used. Furthermore, after bacterial population counts obtained using both sponge swab and excision methods were combined for each sample individually, the enumerated total population (mean log value of the summed data) closely mirrored mean log values for plate counts obtained using the excision sampling method alone (Tables 1-4).

Results from this study confirmed previous data indicating that excision sampling is superior to sponge sampling for the purpose of enumerating total bacterial populations, especially following prolonged exposure and/or tissue chilling (*1, 9, 14, 20, 22*). It is possible that the 24-h period following inoculation may have allowed for firmer bacterial attachment, penetration, or biofilm formation (*3, 4, 8*), thereby decreasing cell recovery during sampling and subsequently reducing the accuracy of the sponge sampling method. The combination counts, including enumerations from both sampling methods, revealed that application of steam vacuuming to post-chilled beef adipose tissue reduced ($P < 0.05$) *Salmonella* populations by 0.5 and 0.7 log CFU/cm², leaving 3.6 and 3.2 log CFU/cm² of *Salmonella* on the treated beef-tissue surfaces (Tables 3 and 4). Obviously, residual levels of *Salmonella* of this magnitude on beef products after treatment would not be acceptable.

Although previous research has demonstrated total coliform count reductions of 1.67 log CFU/cm² (*18*) and of 4.0 log CFU/cm² (*6*) on inoculated beef tissue, both of those studies performed steam vacuuming on hot (non-chilled) beef tissue, leaving bacteria with less time (approximately 15 min) to firmly attach to, and/or penetrate into, the tissue. Results of the present study suggest that, as steam vacuuming was applied in the present study, the procedure may reduce *Salmonella* populations, but used alone, it will not remove or destroy enough *Salmonella* (if the population approximates 5.0 log CFU/cm²) to provide an end-product of suitable microbiological quality. We believe that steam vacuuming, performed in rapid up-and-down or side-to-side movements, is analogous to passing a human hand very quickly through an open flame—no damage is done to either bacteria or human flesh if contact time is insufficient to cause protein coagulation/denaturation.

Steam vacuuming was designed as a spot decontamination treatment, and results following whole carcass application may prove to be inconsistent. As has proven to be the case in research designed to decontaminate beef carcasses in

association with the harvesting process (slaughtering/dressing), greater reductions in microbial populations are achieved when decontamination treatments are combined than when they are used separately and individually (*6, 7, 16*). Especially if the microorganisms have been given time and opportunity to attach, to penetrate, or to form biofilms on beef-tissue surfaces, application of steam vacuuming alone (especially if vacuuming is performed without allowing adequate contact time between heat and pathogen) will not inactivate *Salmonella*. Sequential applications of several decontamination processes (e.g., organic acid rinsing, water washing, steam vacuuming, etc.) should prove much more successful in reducing *Salmonella* on the surfaces of beef tissue, especially if application of steam and/or hot water, in spot decontamination, is done carefully and slowly to achieve maximum contact between heat and bacterial cells.

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SPECIAL REPORT

Unique Watermelon Caused Foodborne Illness

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INTRODUCTION

Gastroenteritis was linked to ingestion of watermelon contaminated by a novel method. The method consisted of injection, into the whole fruit, of a contamined solution that contained sweetener and coloring agent(s) and that was intended to improve flavor and color of the fruit.

Foodborne diseases result from ingestion of foods contamined by either infectious or toxic agents. These diseases, which are sometimes (inaccurately) referred to as food poisoning, represent one of the most widespread and overwhelming public health problems of the modern world. Infants, children, the elderly and the immunocompromised are most commonly affected *(2)*. Involvement of a 6-member family is described here.

The head of the family (age 61), his wife (age 59), their son (age 38), daughter-in-law (age 35), and two male grandchildren (ages 14 and 11) had consumed freshly cut watermelon at 6:00 p.m., about 4 hours before being admitted to the hospital with gastroenteritis. During the previous 7 days, they had consumed home-cooked food and plain water from the domestic supply. The head of the family, who had consumed the lion's share of the fruit and who was the most severely affected, was in a state of shock and was experiencing acute renal failure. Three days were required for his urinary output and renal parameters to improve. He was treated with intravenous fluids, ciprofloxacin, metronidazole and other conservative measures for 5 days. Other members of the family were discharged on the second day of an uneventful stay in the hospital. The daughter-in-law, who had consumed the least fruit, was affected least, experiencing only two or three loose stools during her hospital stay. Haemogramme, urinalysis and chest X-rays of all family members produced normal results. Blood biochemistry of the head of the family suggested uremia and acidosis. Stool cultures of all the members of the family yeilded evidence of Entero invasive *E. coli*, which were non-motile and non-lactose fermenting.

A detailed inquiry regarding the watermelon led to disclosure of the fact that it had been treated with a method that makes it more colorful and sweeter without cutting it open. A long needle inserted into the core, can be used to inject sweetener and coloring agents 3 to 4 hours prior to sale of the fruit. The nature of the injected agents was not revealed by the fruit seller, for obvious reasons. Later, a culture prepared with the solution to be injected (which had been prepared and stored in an earthenware bowl) also grew multiple colonies of Entero invasive *E. coli*, which were biochemically lactose positive, non motile and non-lactose fermenting. A pathogen-contaminated water supply, diarrhea diseases are commonly attributed to but it is now recognized that food plays an equally important role in approximately 70% of such illnesses. Besides the usual items, food vehicles such as raw fish, shellfish, bivalve molluscs (oysters, cockles, mussels), raw shrimp, pork, mixed hors d'oeuvre, crabs, prawns, rock lobster, cooked squid, turkey, street foods, eggs, egg salad, cold asparagus, aquatic plants, bottle feeds (for infants), ice creams, chocolates, candies etc. have been shown to be contaminated. The chief contaminants are bacteria (*E. coli*, *Shigella*, *Salmonella*, *Vibrio cholera* 01, *Campylobacter jejuni*, *Brucella*, *Bacillus cereus*, *Staphylococcus aureus*, *Clostridium perfringens*, and *Clostridium botulinum*), helminthes (*Trichinella spiralis*, *Taenia saginata*, *Taenia solium*, *Clonorchis*, *Fasciola opisthorchis*, *Paragonimus* spp.), protozoa (*Entamoeba hystolitica*, *Giardia lamblia*, *Cryptosporidium* spp.), and enteric viruses (Rotavirus Hepatitis A&E virus, etc.) *(1)*.

Infections caused by pathogenic strains of *E. coli* are probably the most common cause of diarrhea in developing countries. Contamination of food with microorganisms is due to:

1. use of contamined equipment
2. infected food handlers
3. use of raw and contaminated ingredients
4. cross contamination
5. addition of toxic chemicals, or use of foods containing natural toxicants such as poisonous mushrooms.

Gastroenteritis caused by *Salmonella javiana (1)* contamination of watermelon in 1991 has been described in 26 cases in the United States, but contamination of fruits by a novel method such as that described in this case report may prove to be an important public health hazard.

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2002–2003
Secretary Election

The following page contains biographical information for the 2002-2003 Secretary candidates. Review the information carefully as you make your voting decision. Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 22, 2002. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Dairy, Food and Environmental Sanitation*.

If you have questions about the election process, contact David W. Tharp, CAE, Executive Director at 800.369.6337, or 515.276.3344, or E-mail dtharp@foodprotection.org.

The Candidates

J. Stan Bailey

Jeffrey M. Farber

International Association for Food Protection®

Biographical Information

J. Stan Bailey

J. Stan Bailey is a Lead Scientist and Research Microbiologist for the US Department of Agriculture, Agricultural Research Service where he is responsible for research directed toward monitoring, controlling, reducing and ultimately eliminating contamination of live poultry by human enteric pathogens. During his 28 year career, Dr. Bailey has authored or co-authored over 450 scientific publications in the area of food microbiology, concentrating on controlling *Salmonella* in poultry production and processing, *Salmonella* methodology, *Listeria* methodology, and rapid methods of identification.

Dr. Bailey's professional stature is recognized both nationally and internationally as is seen in: (1) election to the position of Chairman of the food microbiology division of the American Society for Microbiology in 1992; (2) serving as Secretary of the Microbiological Methods Committee of the AOAC (Association of Official Analytical Chemists) from 1990-95; (3) appointment to the position of Adjunct Professor in the Poultry Science Department at the University of Georgia, 1994; (4) national and international invitations to speak, teach, participate in committees, and symposia including appointment as Expert Consultant on Animal Feeding and Food Safety by the Food and Agriculture Organization of the United Nations; (5) serving as faculty for 18 years at the "Rapid Methods and Automation in Microbiology Workshop" taught at Kansas State University educating over 900 scientists from 50 countries; (6) being named Fellow of the American Academy of Microbiology, 1994; (7) appointment as technical advisor on poultry production to the National Advisory Committee on Microbiological Criteria in Foods, 1995; (8) appointment as scientific advisor to the International Life Sciences Institute, 1997 to present; (9) winning the ARS Technology Transfer Award and Federal Laboratory Consortium Award for technology transfer; (10) being awarded 7 US Patents; and (11) receiving 14 USDA Certificates of Merit.

Dr. Bailey has been an active Member of IAFP since 1987. His involvement includes organizing and convening numerous symposia, serving as a member of the Program Committee from 1997 to 2001 and serving as Chairperson of this committee in 2001. Dr. Bailey also served as Chairperson of the Poultry Safety and Quality Professional Development Group from 1993-95 and has served on the Editorial Board of the *Journal of Food Protection* since 1997.

Dr. Bailey has a B.S. in Environmental Health Sciences, a M.S. in Food Science and a Ph.D. in Poultry Science all from the University of Georgia. Other professional affiliations for Dr. Bailey include serving on the Editorial Boards of *Poultry Science*, *Journal of Rapid Methods and Automation in Microbiology* and *Journal of Applied Poultry Research* and membership in; Southern Poultry Science Society, Worlds Poultry Science, American Society for Microbiology, American Academy of Microbiology, Poultry Science Society, Georgia Association of Food and Environmental Sanitarians, and AOAC.

Jeffrey M. Farber

Jeffrey M. Farber is currently Director of the Bureau of Microbial Hazards, for the Food Directorate of Health Canada, where he is responsible for the management of research and policy development in the area of microbiological food safety. Prior to assuming the Director's position, Dr. Farber was a Research Scientist in the Bureau of Microbial Hazards for 17 years after completing an NSERC post-doctoral fellowship at Health Canada in 1983. He became Acting Chief of the Microbiology Research Division in 1998, and Associate Director in 2000.

During his 19-year career, Dr. Farber has published over 100 papers in refereed journals, 6 book chapters, edited 2 books, has been, and continues to be an invited lecturer on food microbiology and food safety, internationally. His main areas of expertise are *Listeria monocytogenes*, modified atmosphere packaging, fresh-cut produce, *Enterobacter sakazakii*, and molecular typing of foodborne pathogens. He currently also holds International Life Sciences Institute (ILSI) and Biotechnology grants for work on the virulence, molecular typing and biochip detection of *L. monocytogenes* in foods. In 1999, Dr. Farber was awarded the Seafood Technology Division, Divisional Lecturer award and also received 2 Food Directorate Team Awards in 2001.

Since joining the International Association for Food Protection (IAFP) in 1986, Dr. Farber served on the Program Committee for close to six years, the last year of which he was the Chairperson. Dr. Farber has also given many invited talks, as well as organized numerous symposia at the IAFP Annual Meetings, and has been involved with a number of the Professional Development Groups (PDGs). He has also been a member of the Nominating Committee, Chairperson of the Developing Scientist Award Committee, and actually started the very successful Fruit and Vegetable Safety and Quality PDG, of which he is still a member.

Dr. Farber is currently a member and Treasurer of the International Commission on Microbiological Specifications for Foods (ICMSF). In terms of editorial work, Dr. Farber is currently the Editor of the *International Journal of Food Microbiology* and on the Editorial Board of the *Journal of Food Protection* and the *Italian Journal of Food Science*, as well as being on the *Journal of Food Protection* Management Committee. He has served on Expert Committees for the WHO, FAO and IFT, as well as Scientific and Technical Panels for recent IFT Task Force efforts.

Locally, Dr. Farber has been an Adjunct Professor of Microbiology at the University of Ottawa since 1992, and currently supervises two graduate students.

Dr. Farber obtained his B.Sc. and M.Sc.(A) degrees in Applied Microbiology and Immunology from McGill University in Montreal and his Ph.D. from Food Microbiology, McGill University in Ste. Anne de Bellevue, Quebec.

CALL FOR SYMPOSIA

IAFP 2003

AUGUST 10–13, 2003

NEW ORLEANS, LOUISIANA

The Program Committee invites International Association for Food Protection Members and other interested individuals to submit a symposium proposal for presentation during the 2003 Annual Meeting, August 10-13, 2003 in New Orleans, Louisiana.

WHAT IS A SYMPOSIUM?

A symposium is an organized, half-day session emphasizing a central theme relating to food safety and usually consists of six 30-minute presentations by each presenter. It may be a discussion emphasizing a scientific aspect of a common food safety and quality topic, issues of general interest relating to food safety and quality, a report of recent developments, an update of state-of-the-art materials, or a discussion of results of basic research in a given area. The material covered should include current work and the newest findings. Symposia will be evaluated by the Program Committee for relevance to current science and to Association Members.

SUBMISSION GUIDELINES

To submit a symposium, complete the Symposium Proposal form in its entirety. When submitting a proposal, the presenters do not need to be confirmed, only identified. Confirmation of presenters takes place after acceptance of your symposium.

SYMPOSIUM FORMAT

Symposium sessions are 3 and 1/2 hours in length including a 30-minute break. A typical format is six 30-minute presentations. However, variations are permitted as long as the changes fit within the allotted time frame. If varying from the standard format, be sure to indicate this on the Symposium Proposal form.

SYMPOSIUM PROPOSAL DEADLINE

Proposals may be submitted by mail to the International Association for Food Protection office for receipt no later than June 14, 2002 or by presenting the proposal to the Program Committee at its meeting on Sunday, June 30, 2002 in San Diego, California. Proposals may be prepared by individuals, committees, or professional development groups.

The Program Committee will review submitted symposia and organizers will be notified in August 2002 as to the disposition of their proposal.

PRESENTERS WHO ARE NOT MEMBERS

International Association for Food Protection does not reimburse invited presenters for travel, hotel, or other expenses incurred during the Annual Meeting. However, invited presenters who are not Association members will receive a complimentary registration. Presenters who are Association Members are expected to pay normal registration fees.

ASSOCIATION FOUNDATION SPONSORSHIP

The International Association for Food Protection Foundation has limited funds for travel sponsorship of presenters. After formal acceptance of the symposium, symposia organizers may make requests in writing to the Program Committee Chairperson. Requests are reviewed on an individual and first-come-first-served basis. The maximum funding grant will be $500 per symposium. Organizers are welcome to seek funding from other sources and the Association will provide recognition for these groups in our program materials. Organizers are asked to inform the Association if they obtain outside funding.

HAVE AN IDEA BUT YOU ARE UNABLE TO ORGANIZE IT?

Many Association Members have excellent suggestions for symposia topics, but are unable to organize the session. Such ideas are extremely valuable and are welcome. If you have an idea for a symposium topic, please inform the Program Committee Chairperson as soon as possible. Symposia topics are among the most valuable contribution an Association Member can make to enhance the quality of our Annual Meeting.

WHO TO CONTACT:

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SYMPOSIUM PROPOSAL

IAFP 2003

AUGUST 10–13, 2003

NEW ORLEANS, LOUISIANA

Title: _____

Organizer's Name: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Topic – Suggested Presenter, Affiliation

(Example: 1. HACCP Implementation – John Smith, University of Georgia)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Suggested Convenors:

_____

_____

Description of Audience: _____

Signature of Organizer: _____

Submit by mail
by June 14, 2002 to:

International Association for Food Protection
Symposium Proposal
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA

Submit in person
on June 30, 2002 to:

Program Committee Meeting
IAFP 2002, the Association's 89th Annual Meeting
San Diego, California

or Contact:

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Highlights of the Executive Board Meeting

January 20, 2002

Following is an unofficial summary of actions from the Executive Board Meeting held January 20, 2002 in San Diego, California:

Approved the following:

- Minutes of November 2, 2001 Teleconference Executive Board Meeting
- E-mail votes taken since the November 2, 2001 Executive Board Meeting
- Proposal to place *Journal of Food Protection* online
- Affiliate Charter for Southern California Association for Food Protection pending acceptance of the name by the new Affiliate
- Minimum payment of $2,500 to SCAFP for Local Arrangements support at IAFP 2002

Discussed the following:

- Discussed *DFES* manuscript status. Contact to be made with Student PDG inviting write-ups of short research projects for publication in *DFES*. The Board invites comments by April 15 on *DFES* name change to *Applied Food Protection*
- *JFP* continues to publish articles timely. Record number of submitted articles during 2001 = 499
- Membership Update: Membership continues steady. New Member efforts to expand and online renewal is being studied
- Advertising Update: Ad sales revenue continue to outpace last year's results
- Financial Update: November financial statements reviewed and compared to budget
- Computer network administration outsourced
- Winter Affiliate Newsletter mailed in January and is available online
- IAFP Officers made presentations to two Affiliate organizations this winter. Three are scheduled for spring meetings
- Revisions to the IAFP slide show for Affiliate meetings
- Update on non-compliant Affiliates
- Update on Affiliate Award restructuring
- Possible new Affiliate organizations
- First meeting of new Water Safety and Quality PDG at IAFP 2002
- Encourage colleagues to nominate Members for Awards recognition
- Name the 2002 Oral Developing Scientists First Place Award in honor of Peggy Foegeding, North Carolina State University
- Name the 2002 Poster Developing Scientists First Place Award in honor of Don Splittstoesser, Cornell University
- Student PDG Newsletter sent via E-mail in December
- Planning for IAFP 2002 – tours and social events
- Program Committee report – 23 symposia, 2 lectures, 6 technical sessions, 5 poster sessions
- Ivan Parkin Lecturer confirmed – Dr. Mitchell Cohen, Centers for Disease Control and Prevention
- Exhibit Hall 57% sold out, sponsorship commitments exceed last year
- IAFP 2002 security issues
- Extension of Annual Meeting vs. more sessions in three days
- Retired Member activities room
- Four workshops presented with IAFP 2002
- Future Annual Meeting site selection
- IAFP on the Road – United 2/16-18, Food Safety Summit 3/13-15
- ILSI Food Security Workshop held December 12-13, 2001
- IAFP Foundation Fund Corporate Challenge letters mailed in January
- World Health Organization Non-Governmental Organization
- Proposed bioMérieux scientific symposium
- 3-A Sanitary Standards, Inc. – agree in principal and encourage completion
- Trademark issues on "Advancing Food Safety Worldwide" and "Applied Food Protection"
- IAFP to hold a 3-year board position on the International HACCP Alliance Board

Next Executive Board meeting: Des Moines, Iowa April 20-21, 2002

New Members

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Fernando Valdez
Vinas Argentinas S. A.
Maipu, Mendoza

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Peggy Cheyne
Canadian Food Inspection Agency
Ottawa, Ontario

Thomas G. Hinsperger
The Minute Maid Co., Canada
Mississauga, Ontario

Ron Kuriyedath
SGS Canada Inc.
Vancouver, British Columbia

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Masaaki Sugiyama
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UpDates

Page Named to Head American Dairy Products Institute

Mr. James J. Page became the new chief executive officer of the American Dairy Products Institute (ADPI), effective March 1, 2002. Page will succeed Dr. Warren S. Clark, Jr. who has been with the ADPI for 35 years, 26 of those years as its CEO.

Jim has over 30 years of experience in the dairy industry, serving in management positions at Kraft, Inc., Dean Foods Co., and Land-O-SUN Dairies. Jim received his BBA in Marketing from the University of Georgia in Athens, GA.

Jim has extensive experience in the sales, marketing and general management areas within the dairy industry. He was named marketer of the year by *Advertising Age* in 1998 for his contributions to the development and execution of Dean's Milk Chug beverage program.

Thermo Electron Corporation Assigns New President to Its Weighing and Inspection Business Unit

Ralph Sperrazza has joined Thermo Electron Corporation as president of the thermo electron weighing and inspection business unit, which is part of Thermo Electron's Process Instruments Division.

Ralph is responsible for global management of all the weighing and inspection operations of Thermo Ramsey, Thermo Goring Kerr, Thermo Allen Coding, Thermo Detection and Thermo Moisture Systems.

The Thermo Electron Weighing and Inspection companies are global manufacturers of industrial weighing, inspection, monitoring and control equipment.

Previously, Sperrazza spent 14 years with Honeywell and was most recently the site general manager of the West Coast operations of Honeywell's Burbank, California repair and overhaul facility. Prior to that, he provided financial and operational leadership at the Luton, United Kingdom site during the facility integration with Honeywell. Sperrazza has also had prior assignments in Greer, South Carolina and Stratford, Connecticut in business and financial operations.

Sperrazza has a bachelor degree in business administration from St. Bonaventure University in Olean, NY and a MBA from Sacred Heart University in Fairfield, CT.

FiberMark Appoints New President Duncan Middleton

FiberMark, Inc. has announced the appointment of Duncan Middleton as president of FiberMark. Duncan joins FiberMark following a career with Dexter Corp. and Ahlstrom Corp. He will assume responsibility for leading FiberMark's five divisions.

Most recently, Middleton served as senior vice president for Ahlstrom FiberComposities in Windsor Locks, CT. He previously held the roles of both president and senior vice president in Dexter's nonwovens business, gaining significant international experience in the United States, Belgium, Scotland and Scandinavia. Earlier with Dexter, he held the positions of director-business development, director-operations planning, and financial director Europe.

HACCP Consulting Group Announces Two Additional Principals

The HACCP Consulting Group, L.L.C. has announced that Mr. John Miller, and Mr. Robert (Bob) Galbraith have joined the growing professional staff of the Fairfax, VA based company. "The addition of John and Bob ensures that we will continue to provide highly creditable food safety systems service in a timely manner to our domestic and international clients," says L. L. (Lou) Gast, CEO. Miller and Galbraith both are IAFP Members.

Chr. Hansen Appoints Mr. Thomas Barry as Group Vice President

Chr. Hansen, Inc. announces the formation of a Savory Ingredients Group within the company's North American structure. The Savory Ingredients Group consists of the North America Flavor Business Unit and the North America Seasoning Business Unit.

With the formation of this new Savory Ingredients Group, Chr. Hansen appoints Mr. Thomas A. Barry as group vice president, Savory Ingredients. Mr. Barry has over 20 years of international management experience in North America, Europe and Asia, with a depth of knowledge and experience in the savory ingredient business. He received his B.S. in biology at Marquette University, his M.S. in human nutrition at the University of Missouri, and his M.B.A. at Southern Illinois University.

In addition, Mr. Barry has been appointed site manager of Chr. Hansen's facility in Mahwah, NJ, with responsibility for the day-to-day supervision of all functions within the facility.

Anderson and Lazaro Promoted at AIB International

Jon R. Anderson has been promoted to vice president of audit services from head of audit services at AIB International.

Judi Lazaro has been promoted to head of audit services and assumes Anderson's overall responsibility for AIB audit programs within North America.

Anderson now becomes responsible for all AIB food safety and occupational safety audit services worldwide. He was director of occupational safety education before becoming head of audit services. Before that, he worked for ten years as the senior safety consultant and before that, worked five years as an all food safety auditor. He earned a B.S. degree in biological sciences from Kansas State University in 1981.

Lazaro is a graduate of the University of Houston where she was the pre-law society president and the national leadership society president. Prior to her work with AIB International, Lazaro was a commissioned officer in the US Army and also worked for Frito-Lay, Inc. as a production supervisor and quality assurance manager.

The International Inflight Food Service Association (IFSA) Announces New Chairperson

IFSA is pleased to announce that Ms. Julie Butner is the new chairperson of its Government Affairs Committee. Ms. Butner is the director, global quality systems with LSG Sky Chefs in Arlington, Texas.

Ms. Butner's background includes both bachelor's and master's degrees in food related specialties, several certifications and licenses, and extensive industry experience.

Applied Food Protection

What do you think?

The *DFES* Management Committee proposed to change the name of *Dairy, Food and Environmental Sanitation* to ***Applied Food Protection***. The Executive Board will vote on this change at their April board meeting. Contact any Board Member with your input before April 15, 2002.

Tracking Path of Virulent Bacteria Via the Web

Cornell University food science, engineering and computer science students have joined forces to develop a web-based software and a database to track and compare genetic footprints, or characteristics, of bacteria. For scientists who track the spread and sources of virulent bacteria, the students' PathogenTracker software reduces from days and hours to minutes the time spent making tedious strain comparisons. "Before PathogenTracker, in this laboratory we were using three different databases and two spreadsheets," says Martin Wiedmann, Cornell assistant professor of food science. The food scientists sought the help of the computer science and engineering students, he says, because, "we knew what we wanted but we didn't know how to put the idea together." The new database is novel in that it allows easy comparisons of strain characteristics and visual images of molecular subtypes (DNA fingerprints). The tool thus allows researchers quickly to assemble strain subtype data from different laboratories in order to analyze outbreaks and epidemics of many different infectious diseases and to assess the biodiversity of bacteria in general.

Before PathogenTracker, scientists used off-the-shelf database programs to track foodborne pathogens. But in 1999 Wiedmann first used his then-primitive database to help limit the death toll from a listeriosis outbreak. Between October 1998 and February 1999, more than 100 people became ill and 21 people died around the country after eating hot dogs contaminated with a rare strain of *Listeria monocytogenes* – the deadliest of all foodborne bacteria. Wiedmann's work allowed the Centers for Disease Control (CDC) in Atlanta to determine the cause of the outbreak. Consequently, the contaminated hot dogs were immediately recalled in what was to become one of history's largest food recalls. That early version of PathogenTracker found that seven of the 15 samples had identical genetic fingerprints, meaning that the same strain had caused the illness in seven people. The CDC also had noticed a rise in the number of listeriosis cases, but until Wiedmann's fingerprints, they did not know the strain to look for.

One of the students who developed the new database in Wiedmann's laboratory, Michael Chung began by assembling the pathogen characteristics that the database would need. This included ribotype, DNA sequence and phenotype characteristics. Last fall, Chung began working with a team of computer science students who programmed the software, set up the web server and developed the software's image-recognition capabilities.

By the end of fall 2000, the program was complete. But, says Chung, "it could not be transferred onto multiple computers and it was difficult to add new features." Over the past year, Chung, Cornell graduate student Steven Cai, undergraduate student Mike Bohlander and Qi Sun, of the Cornell Computational Biology Service Unit, have greatly improved the program so that it can now be installed on larger web servers and handle a larger load of data and queries.

Currently within the database there are thousands of digital fingerprints, or "isolates," of foodborne pathogens, spoilage organisms and other bacteria such as *L. monocytogenes*, *Pseudomonas*, *Vibrio parahaemolyticus*, *Streptococcus* and lactic acid bacteria.

Ecolab Announces New Food Safety Services

Ecolab announced it has purchased Audits International, a Chicago, Illinois-based premier provider of food safety audits and food retail quality evaluations. Audits International is a provider of national food safety services with annual sales of approximately $3 million. Terms of the transaction were not announced. Audits International has been providing food safety services to the foodservice industry since 1982. Utilizing audit procedures designed to identify food safety procedures that comply with local, state and federal food safety codes, Audits International provides quality assurance to restaurants, hotels, supermarkets, hospitality and other foodservice establishments through over 150 company-trained field auditors located throughout the country. Audits International's food safety evaluations are custom designed to evaluate and improve performance at the individual property. It will form a new Ecolab service business and operate within the Industrial and Services Sector as a separate business. This business is designed to provide our customers with food safety services including program design, on-site training and certification, audits and reporting.

"As part of the continued pursuit of our Circle the Customer, Circle the Globe strategy, food safety services is a natural extension of our service offer-

ing," said Ecolab's chairman and chief executive officer Allan L. Schuman. "Food safety is one of the top issues facing our customers today, and Audits International is designed to provide scientific food safety services with our technology-based and certified service team. We are now in an even better position to partner with our food service customers on the behavioral and training aspects of food safety."

Plum Good in Killing *E. coli*, Other Pathogens in Meat

Behold, the power of ... dried plums? Long the subject of many medical jokes, dried plums, according to a Kansas State University food microbiologist, can also serve an additional purpose – they possess antimicrobial properties that can help make meat products safer. Daniel Y.C. Fung, a K-State professor of animal sciences and industry, and his graduate research assistant, Leslie Thompson, have tested the effect that varying levels of dried plum mixtures had on ground meat that was contaminated with common foodborne pathogens. Their research, sponsored by the California Dried Plum Board, indicates that raw meats mixed with as little as 3 percent of plum extract are over 90 percent effective in suppressing the growth of major foodborne pathogens such as *E. coli* O157:H7, *Salmonella*, *Listeria*, *Y. enterocolitica* and *Staphylococcus*.

Fung has previously conducted research using spices such as garlic and cinnamon to kill foodborne pathogens in ground beef. Unlike spices, which can alter the taste of meats, Fung said the plum extracts lack a "plum taste" so foods taste "normal." Similar research conducted by scientists at Texas A&M University has found that adding dried plum mixtures to raw meat improved the quality of reheated products by enhancing the moisture of the meat. Fung said adding dried plum mixtures to meat works as an antioxidant to prevent lipid oxidation, which is similar to freezer burn in meat, as well as being an antimicrobial agent to kill pathogens.

Fung said he is excited about the use of plum extracts. In addition to suppressing pathogens, he said the extract also has "good functionality" as it can enhance the moistness of meat and increase the yields. He said adding a prune mixture would be most applicable to school lunch programs, where meat products are prepared at central locations and rewarmed at satellite kitchens. Fung hopes to expand the research to poultry products such as chicken and turkey. Future research will involve experiments to determine if plum extracts can extend the shelf life of meats as well. "The potential is unlimited, this is a win-win situation for everybody involved in food science and safety," Fung said.

Transporters and Retailers: Food Security Preventive Measures Guidance

This guidance represents the FDA's current thinking on appropriate measures that can be taken by food establishments to minimize the risk of food being subjected to tampering or criminal or terrorist actions. It does not create or confer any rights for or on any person and does not operate to bind FDA or the public. This guidance is being issued in accordance with FDA's Good Guidance Practices regulation (21 CFR 10.115; 65 FR 56468; September 19, 2000).

This guidance is designed as an aid to operators of food establishments (i.e. firms that produce, process, store, repack, relabel, distribute, or transport food or food ingredients or that prepare or distribute food at retail). It identifies preventive measures that they can take to minimize the risk that food under their control will be subject to tampering or criminal or terrorist actions. It is relevant to all sectors of the food system (i.e., from farm-to-table), including farms, aquaculture facilities, fishing vessels, producers, transportation operations, processing facilities, packing facilities, warehouses, and retail and food-service establishments. Operators of food establishments are encouraged to review their current procedures and controls in light of the potential for tampering or criminal or terrorist actions and make appropriate improvements. This guidance is designed to focus operators sequentially on each segment of the farm-to-table system that is within their control, to minimize the risk of tampering or criminal or terrorist action at each segment.

Implementing enhanced preventive measures requires the commitment of management and employees to be successful and, therefore, both should participate in their development and review. This guidance is divided into seven sections that relate to individual components of a food establishment operation: management of food security; physical security; employees; computer systems; raw materials and packaging; operations; and finished products. It also covers security strategies and evaluation of the security system. Not all of the guidance contained in this document is appropriate or

practical for every food establishment. Operators should review the guidance in each section that relates to a component of their operation, and assess which preventive measures are suitable for their operation. A process called Operational Risk Management (ORM) may also help operators prioritize the preventive measures that are most likely to have the greatest impact on reducing the risk of tampering or criminal or terrorist actions against food under their control (See: Food Safety and Security: Operational Risk Management Systems Approach, November 26, 2001; www.cfsan.fda.gov).

Risk Assessment of *Campylobacter* spp. in Broiler Chickens and *Vibrio* spp. in Seafood

Preliminary documents on hazard identification, exposure assessment and hazard characterization of *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood have now been posted on both the FAO (www. fao.org/ WAICENT/ FAOINFO/ECONOMIC/ESN/pagerisk/techdoc .htm) and WHO (www. who.int/ fsf/mbriskassess/Tech%20docs. htm) Web sites. These documents were reviewed during the Joint FAO/WHO Expert Consultation on Risk of Microbiological Hazards in Foods which took place in WHO Headquarters, Geneva July 23 to 27, 2001 (www.fao.org/WAICENT/ FAOINFO/ECONOMIC/ESN/ pagerisk/reportCV.pdf) and (www.who.int/fsf/mbriskassess/ reportcv.pdf). A "Call for Public Comment, Scientific Data and Information" has also been issued (www.fao.org/WAICENT/ FAOINFO/ECONOMIC/ESN/ pagerisk/callcom2.htm) (www. who.int/fsf/mbriskassess/ Call_for_comments2.htm). This invites all interested parties to review these documents and provide FAO and WHO with their comments as well as any pertinent data and information that they may have. If you have further comments on these documents, please submit them to FAO and WHO for consideration in the revision of the documents in the course of 2002.

Outbreak of *Salmonella* Serotype *kottbus* Infections Associated with Eating Alfalfa Sprouts — Arizona, California, Colorado, and New Mexico

On March 12, 2001, the California Department of Health Services (CDHS) identified a cluster of *Salmonella kottbus* isolates with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns. During February 1–May 1, CDHS identified 23 patients with *S. kottbus* infections in several California counties and an additional patient from Arizona. This report summarizes the results of the investigation of this outbreak, which identified cases in four states and implicated alfalfa sprouts produced at a single facility. The median age of case-patients was 36 years (range: 9 to 72 years); 16 patients (67%) were female. Twenty-one patients developed an acute diarrheal illness, and three patients had urinary tract infections. Three patients were hospitalized.

Using a standardized questionnaire, a matched case-control study was conducted. A case was defined as culture-confirmed *S. kottbus* infection with onset after January 2001 in a California resident with an isolate having the outbreak PFGE pattern. The first 10 reported California patients were matched with two controls by age group, sex, and city prefix code. Fifteen (63%) of 23 patients ate alfalfa sprouts during the week before becoming ill. A significant association was found between eating alfalfa sprouts and illness (matched odds ratio: 5.5; 95% confidence interval=1.2–26.1). No other food or restaurant exposure was significantly associated with illness. Following the case-control study, 32 patients infected with the outbreak strain of *S. kottbus* were identified in California (24), Arizona (six), Colorado (one), and New Mexico (one).

A traceback investigation identified a single sprout producer as the source of the contaminated sprouts. Review of the sprouter's production records indicated that a single seed lot was temporally associated with the dates of illness onset. A culture of a sample of this seed lot yielded *S. kottbus*. These seeds were imported from Australia in November 2000, but no further information about the distribution of this seed lot was available. Cultures from two floor drains in the production facility also yielded *S. kottbus*. Patient, seed, and environmental isolates all had indistinguishable PFGE patterns. Although the implicated seed lot was last used on March 29, the sprouter issued a voluntary recall of all sprout products on April 17, and ceased all sprout production pending further internal review of their production processes. Review of decontamination and distribution records indicated that at least some seeds underwent heat treatment followed by a 2,000-ppm sodium hypochlorite treatment for 15 minutes. The U.S. Food and Drug Administration (FDA) recommends decontamination of seeds with one or more treatments (e.g., soaking in a 20,000-ppm calcium hypochlo-

rite for 15 minutes) that have been approved for reduction of pathogens in seeds. The effectiveness of alternative seed decontamination has not been established. The sprout producers subsequently agreed to use only the FDA-recommended 20,000-ppm soak when sprout production resumed.

With Updated Information, "You Can Prevent Foodborne Illness"

Each year there are an estimated 76 million cases of foodborne illness in the United States. They result in 5,000 deaths and 75,000 hospitalizations, according to the Centers for Disease Control and Prevention. Many of these illnesses can be avoided by following a few basic food safety guidelines outlined in a newly updated 20-page bulletin available through Washington State University Cooperative Extension. It is designed to help consumers, as well as food professionals, understand the causes and consequences of foodborne illnesses, and act to reduce the risks. The bulletin, "You can prevent foodborne illness," is a collaborative project of Washington State University, the University of Idaho and Oregon State University.

According to WSU food specialist Val Hillers, the bulletin is unique in that it reflects the opinion of experts from around the nation as to what is the most important information to provide the public about safe food handling and preparation. "It's more detailed than our previous publications, and it's more extensive than any I've seen in the country," Hillers said. "It's designed primarily for interested consumers but will also be useful for food safety professionals and educators." When it comes to preventing foodborne illnesses, following five basic food safety guidelines is still the best approach: Practice good personal hygiene, cook foods adequately, avoid cross-contamination with uncooked meats, keep foods at safe temperatures and avoid foods from unsafe sources.

"The single most important thing you can do to prevent foodborne illness is to wash your hands frequently, just like your mother told you," Hillers said. The bulletin provides practical and comprehensive information on how to put the five food safety guidelines to use and which foods present the most risk. It also details the most common known contaminants that are carried by food and how they get into food. It also has information on populations that are at highest risk from foodborne pathogens and the foods they should avoid.

Copies of "You can prevent foodborne illness" (Bulletin PNW0250) can be ordered through the WSU Cooperative Extension Bulletins office for $1.00, plus $1.00 for shipping. To order, call toll-free at 800.723.1763 and request Bulletin PNW0250, or order on-line by visiting http://pubs.wsu.edu. An abbreviated version of the information contained in the bulletin also can be viewed at the recently updated Web site www.foodsafety.wsu.edu.

European Food Safety Authority Approved

A chronology of outbreaks of foodborne disease and food scares, notably bovine spongiform encephalopathy and dioxins in animal feed, has damaged consumer confidence in the safety of the food supply and the ability and commitment of the regulatory agencies to ensure that food is safe. In November 2000, the European Commission put forward a proposal for a Regulation laying down the general principles of food law and establishing the European Food Authority. The European Parliament approved the creation of an independent European Food Safety Authority (EFSA) in a final agreement on December 11, 2001 so that the EFSA can start operating in the first half of 2002. "Safety" has also been added to the title of the new body through an amendment adopted by the Parliament. The EFSA will have a broad mandate, including a wide range of scientific and technical support tasks on all matters having a direct or indirect impact on food safety. The EFSA's mission, therefore, includes the provision of scientific opinions on all issues in relation to animal health and welfare, plant health, and genetically modified organisms without prejudice to the competence conferred to the Agency for the Evaluation for Medicinal Products (EMEA). The EFSA will also have a major task in informing the public about its activities.

The European Parliament also adopted an amendment that would put in place a management board of 15 members, including a representative of the Commission. Four members of the Board will have backgrounds in consumer and industry matters. Members would be appointed by the Council in consultation with the European Parliament. The Parliament has also agreed that the management board will nominate a candidate executive director, who will be required to give a statement and answer questions in front of Parliament before appointment. The location of the new authority is, however, yet to be decided and will be hosted in the interim in Brussels. Helsinki (Finland), Parma (Italy), Lille (France), and Barcelona

(Spain) are among the reported candidates for its permanent location. Further information on the EFSA can be found on the European Commission's Web site at http://europa.eu.int/ comm/ food/fs/efa/index_en.html.

Escherichia coli O157 Outbreak Associated with the Ingestion of Unpasteurized Goat's Milk in British Columbia, 2001

Public health inspectors from the Central Vancouver Island Health Region (CVIHR) investigated an outbreak of *Escherichia coli* O157:H7 in August 2001. The source of the implicated goat's milk in this outbreak was from a co-operative farm south of Nanaimo, on Vancouver Island, British Columbia (B.C.). Nubian goats were co-owned by 18 families at the time of the outbreak. The product label on the distributed milk read as follows: "milked under the strictest sanitary conditions. If pasteurization is desired, heat at 72.8E C for 30 seconds then refrigerate".

Unpasteurized milk from this facility had been distributed to participating families for approximately 10 years. *E. coli* O157:H7 was first isolated from a 1 year old child in a stool specimen submitted to the Nanaimo Hospital on August 14, 2001. Follow-up by public health inspectors implicated either a visit to a petting farm August 5, 2001 or the consumption of unpasteurized goat's milk. No other food source seemed to be implicated. Two other children from the same family (ages 2 and 7) also became ill with bloody diarrhea within 2 to 4 days of the first child falling ill. The family with the three ill children had joined the co-operative 3 months earlier. Two children from another family, visiting the co-operative farm, also became infected. Two of these five infected children were hospitalized and developed hemolytic-uremic syndrome.

Two 1 litre glass bottles of milk from a batch of seven bottles purchased by the first family on August 5, 2001 were sent to the Food Poisoning section, British Columbia Centre for Disease Control Society (BCCDCS) Laboratory Services on August 17, 2001. Milk was enriched in Doyle's broth overnight at 44.5EC and the following morning one bottle was found presumptively positive by VIP® (BioControl Systems, Inc.), a visual immuno-precipitate assay that detects enterohemorraghic *E. coli*. Subsequent isolation of typical colorless colonies on sorbitol MacConkey agar (*E. coli* O157:H7 does not ferment sorbitol) were identified as verotoxin gene positive *E. coli* O157:H7 in the Enterics section, BCCDCS Laboratory Services. All three stools samples received from infected individuals matched the fingerprinting by pulsed field gel electrophoresis (PFGE) subtyping pattern found in the goat's milk. Of interest, fifteen typical colonies picked from direct plates (before enrichment) were not found to be *E. coli* O157:H7 biochemically. This observation, and failure to isolate *E. coli* from the second bottle of milk indicates the pathogenic *E. coli* O157:H7 was present in low numbers in the milk.

On August 23, 2001 an advisory for raw milk suspected in this *E. coli* O157:H7 outbreak was issued by the Acting Medical Health Officer in the CVIHR. No further cases were identified. Commercial pasteurization of milk was first introduced in 1895 after Louis Pasteur discovered the process inactivated spoilage organisms in wine. Today milk is pasteurized both to destroy pathogenic bacteria that may be present, and to improve the shelf life. Pasteurization of milk is required by law in B.C.

Although the link between consumption of raw milk and disease is well established for several organisms (*E. coli*, *Campylobacter*, *Listeria*, *Salmonella*, *Staphylococcus*, *Yersinia*) there are still uninformed individuals who persist in the belief that raw dairy products are healthier, and that pasteurized products are less beneficial, and even harmful.

Visit our Web site
www.foodprotection.org

Industry Products

L. J. Star Incorporated

L. J. Star Inc. Sterile Visual Flow Indicators Meet 3A and FDA Requirements

Designed to be mounted in-line for high purity applications, these sterile-design visual flow indicators provide operators with a clear view of the flow of virtually any process pipeline fluid or powder. They feature an internal-flush style that meets FDA and 3A specifications, based on a unique O-ring seal design that minimizes traps where bacteria can build up. Polished stainless steel connections include sanitary clamp as standard, with butt weld and flange as special order items.

Other premium standard features include the use of borosilicate glass, a product contact surface of 220 Grit Electropolish and an armored housing to help protect the glass from external objects and pipe stress. Units can be used during SIP/CIP and sterilizing/ autoclaving.

Units are available in tube OD sizes from 1/2 to 4 inches with standard lengths from 2-3/4 to 6 inches, depending on OD and ratings up to 150 PSIG. Custom designs and lengths are also available.

Standard material of construction is 316L stainless steel with full material traceability. For corrosive service, Hastelloy is also available. EPDM is the standard O-ring material with Silicone, Viton, and FEP jacketed silicone as options.

L. J. Star Incorporated, Twinsburg, OH

Reader Service No. 348

LF490/LF420 Sanitary Electromagnetic Flowmeter from Toshiba

The LF490/LF420 Series Teflon™ lined magmeter is 3-A approved for applications handling food and beverages.

Toshiba's LF490 Series Sanitary Magmeter is available with a mechanically retained Teflon or ceramic liner. These liners have been specially designed to operate in Clean-in-Place situations where steam cleaning or continuous slurry exposure could damage or stress normal Teflon liners over time. The Teflon liner is molded into a special stainless steel mesh that is mechanically retained in the flowtube giving it exceptional durability and long life in steam cleaning applications. An optional high temperature ceramic lined magmeter is also available for those applications requiring operation up to 180°C.

Suspended particles and other organic materials found in food applications are picked up as electrochemical noise by the magmeter's electrodes. This excess noise can make the magmeter's output erratic and inaccurate if not properly filtered out. In 1993, Toshiba developed a special patented noise suppression circuit that virtually eliminates any noise caused by food particles. The result is a magmeter with a very stable and accurate output in food applications.

Toshiba's patented Functional Field Distribution Technology works effectively to eliminate the errors of non-symmetrical flow caused by upstream projections such as an elbow. There is no need to make expensive piping changes to accommodate the Toshiba sanitary magmeter. Simply mount the meter anywhere.

Toshiba International Corporation, Houston, TX

Reader Service No. 349

Wall Mounted CO_2 Analyzer from CEA Instruments, Inc.

The newly improved CEA 266 is a wall mounted infrared CO_2 gas analyzer contained in a water and dust tight NEMA 4× enclosure with digital display readout. Ranges of 0-2000 ppm, 0-5000 ppm, 0-1%, 0-2%, 0-5%, 0-10%, or 0-20% are available. The sample gas is continuously drawn into the unit through a built-in air pump. A self-draining water trap

The publishers do not warrant, either expressly or by implication, the factual accuracy of the products or descriptions herein, nor do they so warrant any views or opinions offered by the manufacturer of said articles and products.

and dust filter are also provided. The unit includes 0-5 VDC and 4-20 mA outputs and two user adjustable alarms and contact relays.

The CEA 266 is applicable for use in indoor air monitoring, food related industries, breweries, mushroom growing, greenhouse horticulture, welding, office ventilation systems, cooling systems, hazardous environments, laboratory and research projects, and various other applications where CO_2 levels have to be monitored and/or controlled.

CEA Instruments, Inc., Emerson, NJ

Reader Service No. 350

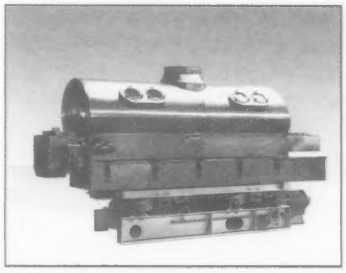
Sensotec, Inc. Amplified Miniature Pressure Transmitter

The Sensotec Model A-105a is a versatile, flush diaphragm, miniature pressure transducer which delivers a high-level, internally-amplified 1-5VDC, 1-10VDC, or 4-20mA output signal. It has an integral voltage regulator and will accept an excitation of 1-6 or 1-11 VDC. The flush diaphragm is welded and measures only .355" in diameter. This design creates zero dead volume and makes the A-105a ideal for operations which involve the robotic spraying or application of paints or other media which can clog conventional pressure ports. The A-105a is fully welded from 17-4PH stainless steel and hermetically sealed, making it a solid performer in harsh or corrosive environments.

The A-105a is sensitive enough to measure ranges from 0-200 psig, yet sturdy enough to handle pressures of 0-15,000 psig. Designed with a one piece, heavy-sidewall body, this rugged unit provides overload protection to 100% (safe) and 300% (burst). Operating temperature is from -65° to 300°F and a number of compensated ranges are available. The A-105a features a 7/16-20 UNF thread.

Sensotec, Inc., Columbus, OH

Reader Service No. 351



Ventilex USA

Ventilex Fluid Bed Dryer with Unique Design is Ideal for Conditioning in the Food and Dairy Industries

Fluid Bed Dryers from Ventilex USA, with a revolutionary yet simple transport design and unique drive system, are ideal for conditioning a wide variety of dairy and food products from cheese and lactose to cereals, chocolate, breadcrumbs and soya.

The Ventilex design is unique because the entire dryer is part of the movement or conveyance of the dairy or food product. The amplitude of the movement remains constant while the frequency can be varied over a wide range according to the required transport speed, which enables accurate adjustment of the product drying times. Since the amount of air needed for drying is minimal, Ventilex Fluid Bed Dryers produce big benefits in terms of smaller ancillary equipment and large energy savings.

The heart of the Ventilex transport system is the revolutionary but logical drive mechanism, in which the dryer is supported on air bellows, which are accurately adjusted according to the product requirements. The entire dryer is attached to the upper steel C beams and the entire product bed is raised and moved forward within the Fluid Bed Dryer simultaneously.

The air bellows keep the correct amount of spring action across the Fluid Bed Dryer as they are all connected to the same pressurized control system. A pressure monitor closely checks the air pressure to ensure that the bellows are not over- or under-pressurized and the pressure is kept within a very accurate range.

With this simple system, processors are assured that product is transported in a first in-first out series, one of the biggest advantages the Ventilex mechanism offers over vibratory drives. The entire time-proven drive system has few moving parts and is simple in design, so it is easy to maintain and is mechanically reliable.

All Ventilex Fluid Bed Dryers are constructed with stainless steel in the process areas. Optional equipment available includes a Clean In Place (CIP) system and a Sanitary Design Standard that exceeds strict USDA guidelines for hygiene and sanitation.

Ventilex USA, Mason, OH

Reader Service No. 352

Breakthrough in Rapid, On-site Diagnostic Test for Mad Cow Disease from Genesis Bioventures, Inc.

Genesis Bioventures, Inc. (formerly BioLabs, Inc.) has announced that one of its portfolio companies, Prion Developmental Laboratories, Inc. (PDL) is currently in late-stage discussions with a European pharmaceutical company to provide them with an easy-to-use, patents pending rapid strip test for detecting Bovine

Spongiform Encephalopathy (BSE), or Mad Cow Disease.

The lateral flow strip test, developed by scientists at PDL, has been tested at Case Western Reserve University (CWRU) in Cleveland, Ohio and the Institute for Basic Research and Developmental Disabilities (IBR) in Staten Island, New York. It is similar to a home pregnancy test and will be used on-site using brain tissue taking less than five minutes to complete with accurate, easily interpreted results. To date, there are no rapid tests that can be performed at the slaughterhouse that will ensure that BSE infected cattle do not enter the human food chain. In addition to BSE, the PDL test platform has also been used to successfully detect prion diseases in human and other animal brain tissue.

The strip test, utilizing PDL's patents pending proprietary reagents and assay technology has been proven to be simple yet accurate and inexpensive. It is anticipated that the test will be reviewed and evaluated in Europe Q1 2002 prior to being certified for commercial release in the massive global cattle industry. The vitality of the beef industry in Europe, and more recently Japan, depends on the development of such a test. The detection of BSE in Japan suggests that the disease may in fact be worldwide. The ultimate size of the world market for a post-mortem test is nearly 100 million head of cattle per year.

Employing a new methodology, researchers in Israel recently discovered prions in urine, a finding that was previously thought to be improbable. Studies to date have shown that the protein can be found in urine well before symptoms appear and laboratories worldwide have been hastening to validate the discovery. PDL has now confirmed the presence of prions in urine samples of infected animals by using PDL's proprietary reagents. Research is currently underway to adapt the PDL test for analysis of urine samples, which would provide the world's first practical pre-mortem diagnostic test for BSE. Once the test has been proven in cattle, development and completion of a similar test for humans and other animals would be accelerated, ensuring safe blood products, donor tissue and surgical instruments.

Genesis Bioventures, Inc., New York, NY

Reader Service No. 353

IQ Scientific Instruments, Inc.

IQ Scientific Instruments Palm pH Meter Uses Glass or Non-Glass Probes

This 1Q400 pH system combines the convenience of low maintenance stainless steel pH probes with the power of the PDA (personal digital assistant). The system is a pH module coupled with the best selling Handspring Visor™ with Palm OS™ operating system.

Data can be easily gathered and sent to a PC with the push of a button and the last 50 calibrations are stored to keep you compliant with regulations. Features include touch-screen graphics display, pop-up windows and on-screen troubleshooting guides for each function. You can even save digitized handwritten notes and sketches with your pH readings. Other IQ400 features are high/low pH level alerts, recalibration, alarms, automatic buffer recognition, save/recall of up to 9999 records and automatic temperature compensation. A cradle is included so the IQ400 can be used as either a handheld or bench top pH meter.

IQ Scientific Instruments, Inc., San Diego, CA

Reader Service No. 354

Italcoppie "TRE" Low Cost RTD Probes from the Instrumentation Group

The Instrumentation Group has introduced a new series of low cost, high performance Italcoppie® brand RTD probes. These rugged, long-lasting, cost-effective and accurate sensors provide a temperature measurement alternative for many applications.

The TRE series probes are constructed from a single Platinum 100 RTD sensor meeting IEC 751 Class B accuracy standards. The sensor is insulated with densely packed magnesium oxide and imbedded in a 3 mm O.D. shank formed from 316 stainless steel.

Shank lengths of 100, 150, and 250 mm (3.94", 5.91", and 9.84") are available. The resulting probe assembly is molded into a nylon terminal measuring 8 mm in diameter by 25 mm in length (.315" × .984"). The TRE probe is finished with a length of copper connection cable (22 AWG) covered with a silicon rubber insulation that provides protection up to 180°C (356°F). The connecting cable is available in 1,000 or 2,000 mm (3' 3" or 6' 6") lengths.

The resulting temperature sensing probe is strong, extremely flexible, watertight, and accurate. Suitable for measuring temperatures from -50° to 500°C (-58° to 932°F), TRE probes are ideal for a wide range of applications, including process monitoring and control, HVAC/R, water treatment, oil and gas production, and many others. The rugged one-piece construction is an advantage in harsh environments and seals out harmful, corrosive liquids.

To further aid accuracy and facilitate recalibration, individual TRE probes are permanently etched with the exact resistance test value (in Ohms) at 0°C, loop resistance included. The manufacturing date and a traceable lot number are also etched in the probe shank surface.

Instrumentation Group, Asheville, NC

Reader Service No. 355

Cox Technologies to Provide Temperature Labels to Monitor Ground Beef Shipments for American Foods Group

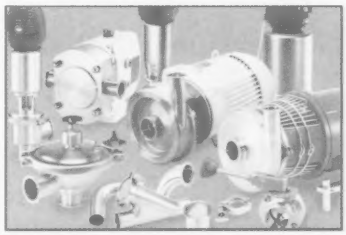
Cox Technologies, Inc. has announced the addition of American Foods Group, Inc. a major beef producer for US markets, as a customer of its innovative time and temperature sensing labels, the Vitsab® Time Temperature Integrator (TTI).

The Vitsab® TTI label reveals if a product has been time and temperature abused. If either abuse occurs during refrigerated distribution or storage, the product quality, appearance and weight at retail end-point can be degraded. Retailers who have tested the Vitsab® TTI labels report that they are very effective in stock management and in maintaining a safe "cold chain" for products shipped from supplier to distribution warehouses and finally to retail stores.

The Vitsab® TTI labels are inexpensive adhesive labels that are attached to wholesale food cartons. They indicate – by simple color-changing dot – whether a particular carton has been exposed to damaging lengths of time and high temperatures.

Cox Technologies, Inc., Belmont, NC

Reader Service No. 356



Alfa Laval Inc.

Alfa Laval Releases New Consolidated Sanitary Fluid Handling Product Line

Alfa Laval announces the release of a new consolidated product line. The line includes pumps, valves and fittings previously sold under the Alfa Laval and Tri-Clover brand names. The broadened product range is a result of the consolidation of Alfa Laval and Tri-Clover in December 2000. The consolidated product line results in the most comprehensive portfolio offered by any company in the North American sanitary processing industry.

At the time of the consolidation, Alfa Laval added sanitary plate heat exchangers and Contherm® scraped-surface heat exchangers to the product line. Other products include fittings and tubings, single-seat processing valves, double-seat mixproof valves including the Unique Mixproof Valve, control and indication units such as the ThinkTop, centrifugal pumps, positive displacement pumps, blenders, filters and strainers, tank equipment and instrumentation.

Alfa Laval Inc., Pleasant Prairie, WI

Reader Service No. 357

Eriez Magnetics' New 275 tph Vibratory Feeder Saves Power

Eriez has added the new 68B Heavy-Duty Feeder to its line of AC operated vibratory products. The 68B is designed to accurately feed large quantities of bulk materials in rugged environments. Standard setup features a suspended 24" × 42" tray anchored to a below-deck drive with a rated capacity of 275 tph when installed at a 10° slope. Eriez' patented, heavy duty electromagnetic AC drive requires 45% less electricity than other feeders in its class.

Ideal for handling aggregates, slag, coal, ores or grains, the 68B is available in a variety of open and tubular trays made of stainless or mild steel. The dust-tight, epoxy-coated, AC drive requires no rectifier or rheostat and ships with a N12 solid-state 100% variable speed control unit.

Normally suspended from rods, the feeder can be floor mounted as well. Setup with an overhead drive mount is also available.

Eriez Magnetics, Erie, PA

Reader Service No. 358

Ivan Parkin Lecture

will be presented by

Mitchell L. Cohen, M.D.

Director
Division of Bacterial and Mycotic Diseases
National Center for Infectious Diseases
Centers for Disease Control and Prevention
Atlanta, Georgia

Food Safety in the Time of Anthrax

Sunday, June 30, 2002

Opening Session — 7:00 p.m.

Mitchell L. Cohen, M.D.

Dr. Mitchell L. Cohen received his undergraduate and medical degrees from Duke University. His postgraduate training was in internal medicine at the University of Texas Southwestern Medical School, and his Infectious Disease Fellowship was completed at the University of Washington in Seattle. Since 1976, he has held positions in the Enteric Diseases Branch; Hospital Infections Program; and Office of the Director in the Division of Bacterial and Mycotic Diseases. His research interests include the epidemiology of antimicrobial resistance, foodborne diseases, and the application of molecular biology techniques to answer epidemiologic questions. He has been editor and reviewer for a number of scientific journals. He is a Fellow in the American College of Physicians and the Infectious Diseases Society of America. Dr. Cohen has been a member of several advisory committees including the Recombinant DNA Advisory Committee, National Institutes of Health, and the National Advisory Committee on Microbiological Criteria for Foods.

Preliminary Program

Sunday, June 30, 2002 – 7:00 p.m.

***Opening Session* — Ivan Parkin Lecture: "Food Safety in the Time of Anthrax"**

Monday, July 1, 2002

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Antibiotic Resistance in Humans and Feed Animals
- Viruses in Food
- Development in Intervention Technologies to Enhance Produce Safety
- Safety of Latin-Style High Moisture Fresh Cheese

Technical Session

- Meat and Poultry Microbiology

Poster Session (10:00 a.m. – 1:00 p.m.)

- Microbiological Methods and Antimicrobials

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- Enhancing Agricultural Security
- Minimizing the Risk of *Salmonella* Enteritidis in Shell Eggs
- Microbiological Food Safety at Retail
- Extended Shelf Life Meat Products — Issues and Interventions

Technical Session

- Microbiological Methods

Poster Session (3:00 p.m. – 6:00 p.m.)

- General Food Microbiology

Tuesday, July 2, 2002

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Cooperating to Improve Foodborne Outbreak Investigations
- Integrated Approaches for the Study and Control of Foodborne Pathogens in Meat and Poultry
- *Listeria* Research Update
- Current Issues in Seafood Safety

Technical Session

- GMOs and Produce

Poster Session (10:00 a.m. – 1:00 p.m.)

- Produce, Meat, and Seafood Microbiology

Afternoon — 1:30 p.m. – 3:30 p.m.

Symposium Topics

- Controlling *Clostridium perfringens* Hazards during Cooling
- Innovations in Retail Food Safety Management Systems and Technology
- Alternatives in Dairy Waste Management: Create New Products or Generate Power!

Technical Session

- Public Health and Outbreaks

Lecture Topics

- ICMSF Lecture on Current Topics (1:30 p.m. – 2:30 p.m.)
- WHO/FAO Lecture on Current Risk Assessment Work (2:30 p.m. – 3:30 p.m.)

Business Meeting — 4:00 p.m. – 5:00 p.m.

Wednesday, July 3, 2002

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Chronic Wasting Disease and Other Transmissible Spongiform Encephalopathies
- Applications of DNA Chip Technology in the Food Safety Area
- Sanitary Design of Plants and Equipment
- Risk Assessment of Food Workers Hygiene Practices and Intervention Strategies

Technical Session

- General Food Microbiology

Poster Session (9:00 a.m. – 12:00 p.m.)

- Produce and Meat Microbiology

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- Customized Approaches to Microbial Risk Assessment
- Control of *Escherichia coli* O157:H7 in Cattle
- Current Practices in Produce Safety
- Food Safety Education Update

Technical Session

- *Antimicrobials*

Poster Session (2:00 p.m. – 5:00 p.m.)

- Poultry, Meat and General Food Microbiology

89th Annual Meeting

June 30–July 3, 2002

Event Information

EVENING EVENTS

Cheese and Wine Reception

Sunday, June 30, 2002 • 8:00 p.m. – 10:00 p.m.

Attendees and guests are invited to this traditional reception in the exhibit hall.

Exhibit Hall Reception

Monday, July 1, 2002 • 5:00 p.m. – 6:30 p.m.

Network with fellow food safety professionals during this informal reception while seeing the latest developments in the industry.

Monday Night Social at the San Diego Zoo

Monday, July 1, 2002• 6:00 p.m. – 10:00 p.m.

Polar Bear Plunge, Tiger River, Gorilla Tropics and Ituri Forest – sound interesting? The World-Famous San Diego Zoo has been the gem of the city of San Diego for more than 80 years. Join us for the Monday Night Social and see first hand some of the world's rarest wildlife. Dinner will be provided in a reserved area for IAFP 2002 attendees. The Zoo will remain open to you and the public until 10:00 p.m. Explore the Zoo on a three-mile guided double-deck bus tour or go on your own adventure. Price includes admission to the Zoo, dinner, and transportation. Get your ticket today!

San Diego Dinner Cruise

Tuesday, July 2, 2002 • 6:00 p.m. – 10:30 p.m.

The celebration begins the moment you board the Hornblower Yacht. Watch the sun go down, sip champagne and enjoy a three-course dinner prepared fresh on board by talented chefs. Then dance to music or watch the San Diego sights drift by from the outdoor decks. Tickets are limited so get yours today.

Awards Banquet

Wednesday, July 3, 2002 • 7:00 p.m. – 9:30 p.m.

A special occasion to formally recognize the accomplishments of deserving food safety professionals. An elegant reception and dinner are followed by the awards ceremony. Business attire requested.

IAFP FUNCTIONS

New Member Reception

Saturday, June 29, 2002 • 4:30 p.m. – 5:30 p.m.

If you recently joined the Association or if this is your first time attending an IAFP Annual Meeting, welcome! Attend this informal reception to learn how to get the most out of attending the Meeting and meet some of today's leaders.

Affiliate Reception

Saturday, June 29, 2002 • 5:30 p.m. – 7:00 p.m.

Affiliate officers and delegates plan to arrive in time to participate in this educational reception. Watch your mail for additional details.

Committee Meetings

Sunday, June 30, 2002 • 7:00 a.m. – 5:00 p.m.

Committees and professional Development Groups (PDGs) plan, develop and institute many of the Association's projects, including workshops, publications, and educational sessions. Share your expertise by volunteering to serve on any number of committees or PDGs.

Student Luncheon

Sunday, June 30, 2002 • 12:00 p.m. – 1:30 p.m.

The mission of the Student PDG is to provide students of food safety with a platform to enrich their experience as Members of IAFP. Sign up for the luncheon to help start building your professional network.

IAFP Job Fair

Sunday, June 30, 2002 thru Wednesday July 3, 2002

Employers, take advantage of recruiting the top food scientists in the world! Post your job announcements and interview candidates. Watch for additional information at www.foodprotection.org.

DAYTIME TOURS

(Lunch included in all daytime tours)

Wine Country Tour

Saturday, June 29, 2002 • 10:00 a.m. – 3:00 p.m.

The Temecula Valley Wine Country tour takes you on a visit to the Callaway and Thornton (formerly Culbertson's) Wineries. Guests will enjoy a private in-depth tour and a lecture-tasting of white wine at Callaway.

Afterwards, we will cross the road to Thornton for a short tour on the art of making fine champagnes. Thornton still employs the French method of hand turning the bottles during the fermenting process.

A box lunch will be served. You will be sure to enjoy this Southern California wine tasting experience!

Scenic San Diego by Land and Sea

Sunday, June 30, 2002 • 10:00 a.m. – 3:00 p.m.

Visit San Diego, the city that glistens by the sea!

The highlights of "America's Finest City" will be presented on this narrated guided tour. You will see areas such as: Old Town, Balboa Park, and San Diego's Downtown areas including the Gaslamp District and Horton Plaza. We will then tour and enjoy lunch in one of California's most charming coastal resort towns, Coronado Island.

After seeing the city by land, you will board a yacht to cruise the calm waters of the San Diego Bay. Guides will narrate points of interest such as the Coronado Bay Bridge, the Navy shipyards and aircraft carriers, Shelter Island, Harbor Island and North Island. You will enjoy this relaxing day of learning about the city that glistens by the sea!

La Jolla: The Jewel of San Diego

Monday, July 1, 2002 • 10:00 a.m. – 3:00 p.m.

La Jolla, with the tantalizing charm of a Mediterranean Isle, unique shops and breathtaking views of the Pacific, is a refreshing change of pace sure to delight even the most discriminating visitor! You will see the La Jolla Bay and Cove area. The famed La Jolla Underwater Park, maintained as an ecological reserve, is a favorite spot for scuba divers and snorkelers.

Tour guests will delight in a special 45-minute historical walking tour of La Jolla. This tour will bring the history of La Jolla to life with a personal docent who is a resident expert.

Shopping is always an extraordinary experience in La Jolla. Among the many boutiques, import shops, galleries and specialty food shops, you are sure to find unique and exclusive gifts.

A delicious lunch at George's at the Cove, one of the many fine restaurants in La Jolla, will be a special treat for all.

Behind the Scenes at the Wild Animal Park

Tuesday, July 2, 2002 • 9:00 a.m. – 2:00 p.m.

The San Diego Wild Animal Park began more than 20 years ago as a breeding facility for the San Diego Zoo's large animals. Dr. Charles Schroeder had the vision to open the 2,100-acre wildlife sanctuary for visitors to view animals roaming freely in settings similar to their native homelands. Known worldwide for its conservation efforts, the Wild Animal Park boasts over 3,000 animals from over 250 species and over 3,000 different exotic plant species.

You will enjoy a "Beastly Business" tour at the Wild Animal Park. This tour offers participants a private guided program focusing on the mammal, bird, and plant collection at the Wild Animal Park. Guests will enjoy a private monorail tour to view the extensive Asian and African field enclosures where rhinos, antelopes, giraffes, monkeys, elephants, and flamingo can be spotted from the train.

The entire program is conducted by a personal guide who can share the latest updates on animal births, new exhibit plans, and ways to help conserve endangered animals and their habitat.

As part of the "Behind the Scenes Tour," you will also experience a privately guided walking tour and an up close encounter with an exotic animal and its trainer in a special VIP Program. A lunch voucher is included so you can grab a bite to eat while enjoying your day at the Wild Animal Park.

HOSPITALITY ROOMS

Spouse/Companion Room

Register your spouse/companion and they will have access to the hospitality room where a continental breakfast and afternoon snacks are provided Sunday through Wednesday.

Retired Member Room

At the request of IAFP Retired Members, a room has been set aside for their use. A cribbage board, cards, and other games will be available. You are invited to bring your favorite game to challenge your fellow retired colleagues.

89th Annual Meeting

June 30–July 3, 2002

IMPORTANT! Please read this information before completing your registration form.

MEETING INFORMATION

Register to attend the world's leading food safety conference.

Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Program and Abstract Book

4 EASY WAYS TO REGISTER

Complete the Attendee Registration Form and submit it to the International Association for Food Protection by:

Online: www.foodprotection.org

Fax: 515.276.8655

Mail: 6200 Aurora Avenue, Suite 200W,
Des Moines, IA 50322-2864, USA

Phone: 800.369.6337; 515.276.3344

The early registration deadline is May 30, 2002.
After this date, late registration fees are in effect.

REFUND/CANCELLATION POLICY

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by June 7, 2002. No refunds will be made after June 7, 2002; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after July 8, 2002. Event and tour tickets purchased are nonrefundable.

International Association for Food Protection®

EXHIBIT HOURS

Sunday, June 30, 2002	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, July 2, 2002	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

(Lunch included in all daytime tours)

Saturday, June 29, 2002	
Wine Country Tour	10:00 a.m. – 3:00 p.m.
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Scenic San Diego by Land and Sea	10:00 a.m. – 3:00 p.m.
Monday, July 1, 2002	
La Jolla: The Jewel of San Diego	10:00 a.m. – 3:00 p.m.
Tuesday, July 2, 2002	
Behind the Scenes at the Wild Animal Park	9:00 a.m. – 2:00 p.m.

EVENING EVENTS

Sunday, June 30, 2002	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	
Exhibit Hall Reception	5:00 p.m. – 6:30 p.m.
Monday Night Social at the San Diego Zoo	6:00 p.m. – 10:00 p.m.
Tuesday, July 2, 2002	
Dinner Cruise	6:00 p.m. – 10:30 p.m.
Wednesday, July 3, 2002	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an International Association for Food Protection Annual Meeting attendee to receive a special rate of $143 per night, single or double. Make your reservations as soon as possible; this special rate is available only until May 30, 2002.

Manchester Grand Hyatt San Diego
(Formerly Hyatt Regency San Diego)
One Market Place
San Diego, California 92101
Phone: 800.233.1234
619.232.1234

International Association for
Food Protection®
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

Attendee Registration Form

June 30–July 3, 2002
San Diego, CA

Name (Print or type your name as you wish it to appear on name badge) _____ Member Number: _____

Employer _____ Title _____

Mailing Address (Please specify: ❒ Home ❒ Work) _____

City _____ State/Province _____ Country _____ Postal/Zip Code _____

Telephone _____ Fax _____ E-mail _____

❒ First time attending meeting Member since: _____

❒ Regarding the ADA, please attach a brief description of special requirements you may have.

❒ IAFP occasionally provides Attendees' addresses (excluding phone and E-mail) to vendors and exhibitors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

PAYMENT MUST BE RECEIVED BY MAY 30, 2002 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	$ 295 ($345 late)	$ 445 ($495 late)	_____
Association Student Member (Awards Banquet included)	$ 50 ($ 60 late)	Not Available	_____
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Awards Banquet (Wednesday, 7/3)	$ 45 ($ 50 late)	_____	_____

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Coming Events

APRIL

·3-5, Missouri Milk, Food and Environmental Health Association Annual Meeting, Ramada Inn, Columbia, MO. For further information, contact Linda Haywood at 417.962.4243.

·9-10, Upper Midwest Dairy Industry Association Spring Meetings. April 9, 2002 at the Best Western Hotel, Mankato, MN. April 10, 2002 at the Holiday Inn, Alexandria, MN. For further information, contact Paul Nierman at 763. 785.0484.

·11-12, Lead Auditor Seminar, St. Louis, MO. For further information, contact Kelly Mayberry at 800.477.0778 ext. 302.

·11-13, International Fresh-cut Produce Assocation's (IFPA) 15th Annual Conference and Exhibition, Millennium Biltmore Hotel and the Los Angeles Convention Center, Downtown Los Angeles, CA. For additional information, call 703.299.6282; Web site: www.fresh-cuts.org.

·18, Indiana Environmental Health Association, Inc. Spring Conference, Valle Vista, Greenwood. For further information, contact Helene Uhlman at 219.853. 6358.

·19-24, Conference for Food Protection, Sheraton Nashville, Nashville, TN. For further information, contact Trevor Hayes at 408.848.2255; E-mail: TWHgilroy @aol.com.

·22-24, Microbiology I: Practical Microbiology & Troubleshooting Course, Guelph Food Technology Centre, Guelph, Ontario, Canada. For further information, contact Marlene Inglis at 519.821.1246 ext. 5028; E-mail: minglis@gftc.ca.

·23-24, HACCP Seminar, Chicago, IL. For further information, contact Kelly Mayberry at 800.477. 0778 ext. 302.

·24-25, HACCP Workshop, Cherry Hill, NJ. For further information, contact AIB at 785.537. 4750.

·24-30, Interpack 2002, Düsseldorf, Germany. For further information, call 312.781.5180; E-mail: info@mdna.com.

·26, Fifth Annual Symposium on Industrial and Fermentation Microbiology, Radisson Center, La Crosse, WI. For further information, contact Dr. S. N. Rajagopal at 608. 785.6976; E-mail: rajagopa.s@uwlax. edu.

·30-May 1, Advanced HACCP Workshop, Chicago, IL. For further information, contact AIB, at 785. 537.4750.

MAY

·8, Metropolitan Association of Dairy, Food and Environmental Specialists Spring Seminar, Cook College Campus Center, Rutgers University, New Brunswick, NJ. For further information, contact Carol Schwar at 908.689.6693.

·8-10, Environmental Health: Protecting Children, West Coast Olympia Hotel, Olympia, WA. For further information, contact Rick Zahalka at 425.339.5250; E-mail: rzahalka@shd.snohomish.wa.gov.

·13-15, Pennsylvania Association of Milk, Food and Environmental Sanitarians Spring Meeting, Nittany Lion Inn, State College. For further information, contact Eugene Frey at 717.397. 0719.

·14-15, Applied Dairy Chemistry Short Course, University of Wisconsin-Madison, Madison, WI. For further information, contact Dr. Bill Wendorff at 608.263.2015.

·20-22, Microbiology and Engineering of Sterilization Processes Course, St. Paul, MN. For further information, contact Ms. Ann Rath at 612.626.1278.

·20-24, 3-A Sanitary Standards Committee Annual Meeting, Sheraton Four Points Hotel, Milwaukee Airport, Milwaukee, WI. For more information, contact Tom Gilmore at 703.761.2600; E-mail: tgilmore@iafis.org.

JUNE

·4-5, Clean-In Place (CIP) Short Course, Michigan State University, East Lansing, MI. For further information, call 517.355.7713 ext. 177; E-mail: partridg@msu.edu.

·4-6, Penn State Food Microbiology Short Course: Detection and Control of Foodborne Pathogens, Penn State Berks Campus, Reading, PA. For further information, Dr. Cathy Cutter at 814.865. 8862; E-mail: cnc3@psu.edu.

·28-29, IAFP Workshops, San Diego, CA.

Workshop I – "Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*"

Workshop II – "Current Practices in Produce Safety: GAPs and GMPs"

·29, IAFP Workshops, San Diego, CA.

Workshop III – "Control of Pathogens in the Dairy Processing Environment"

Workshop IV– "Media Training for the Scientific Community"

Additional workshop information available in the next issue of *DFES*.

·30-July 3, IAFP 2002, the Association's 89th Annual Meeting, San Diego, CA. Registration materials available in this issue of *DFES* on page 219 or visit our Web site at **www.foodprotection.org** for the most up-to-date Annual Meeting information.

JULY

·12-19, 22nd International Workshop/Symposium on Rapid Methods and Automation in Microbiology, Manhattan, KS. For further information, contact Daniel Y. C. Fung at 785.532.5654; E-mail: dfung@oznet.ksu.edu.

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Pre-Meeting Workshops

Friday–Saturday, June 28-29, 2002

- Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*
- Current Practices in Produce Safety: GAPs and GMPs

Saturday, June 29, 2002

- Control of Pathogens in the Dairy Processing Environment
- Media Training for the Scientific Community

More details will be available in the April issue of *DFES*, or visit our Web site at **www.foodprotection.org** for the latest information

In Memory of...

Peggy Matthews Foegeding

Dr. Peggy Matthews Foegeding, a leading food microbiologist and long time Member of IAFP, passed away on January 15, 2002. She obtained her B.S. degree from the University of Missouri and M.S. and Ph.D. degrees from the University of Minnesota. Dr. Foegeding joined the Food Science Department at North Carolina State University where she served as a professor from 1982 until her retirement in 1999.

In addition to Dr. Foegeding's involvement with IAFP, she was an active member in the Institute of Food Technologists (IFT) and the American Society for Microbiology (ASM). Over the course of her career, she taught food microbiology to hundreds of undergraduate students, mentored over 25 graduate students, and published over 70 papers. Her awards include the NC State University Sigma Xi Research Award (1989) and the IFT William V. Cruess Award for outstanding teaching and advising (1994). Peggy was elected as a Fellow in the American Academy of Microbiology in 1994 and as an IFT Fellow in 1999.

Peggy Foegeding was an innovative researcher, a gifted teacher, and an enthusiastic advocate for food safety. Although having made so many contributions, she is perhaps best remembered as a caring and devoted teacher who saw the potential for success in all students. She has influenced the lives of countless young food scientists and her loss will be felt by many. Perhaps the words of one of our IAFP colleagues expressed it best when he said, "...a bright and shining star has gone out way too soon. Let's all work a little harder to keep the food microbiology torch burning, keep pushing in new directions to honor all the good things that Peggy stood for."

A scholarship has been established at North Carolina State University in memory of Dr. Foegeding. Contributions may be sent to: The Peggy Foegeding Memorial Fund, c/o Food Science Department, North Carolina State University, Box 7624, Raleigh, NC 27695-7624.

Continued from page 232

an immune system less prone to allergic response. In other developments on the horizon, the genetic engineering of bacteria to express a shiga toxin binding site has been documentated. In a mouse model, these bacteria reduce the infectivity of STEC (Paton et al., 2000). In another recent approach, *Lactococcus lactis* was engineered to secrete interleukin-10 and was used to reduce colitis symptoms in a mouse model; the organism was proposed as an approach for treating inflammatory bowel disease (Steidler et al., 2000). Capitalizing on the mucosal immune response of the gut, the largest immune organ in the body, scientists have been engineering live lactic acid bacteria as carriers of antigens to serve as oral vaccines against a variety of targets (Pouwels et al., 1996). These studies demonstrate the versatility of probiotics as useful tools for the functional food industry and the promotion of public health.

As thrilling as many of these developments are, numerous gaps still exist in our understanding of the mechanisms and of the extent to which probiotics play roles in human health. Mechanisms of action need to be clarified, with an eye to understanding strain- and dose-dependency of effects. More long-term, controlled evaluations in meaningful numbers of human subjects with physiologically relevant endpoints are needed. Technological problems of survival and maintenance of relevant biological activities during product manufacture and storage must be better understood. Addressing many of these issues is a group of scientists of the International Scientific Association for Probiotics and Prebiotics (www.fp.rdg.ac.uk/isapp/) at a workshop to be held in London, Ontario, in May 2002. The power of genomics is being applied to these problems, with announcement of the sequencing of the complete genomes of several lactic acid bacteria expected to be completed early in 2002.

It has been a long path from the observation in 1906 that fermented milk with live bacteria played a role in the health of Bulgarians to applying the power of modern microbial genetics and medical technology to understanding and use of probiotics in human health. But perhaps the situations of today suggest a great need. We face a new millennium in which the realities include crises of antibiotic-resistant pathogens, threats of super-virulent pathogens from animal agriculture, rising health care costs in which a prevention focus is more cost effective, as well as more humane and prudent, and an aging population looking for ways to stay healthy. Development of multi-faceted approaches to dealing with these issues, including probiotic bacteria, makes sense. Additional information on probiotics can be found at www.usprobiotics.org.

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Official Publication

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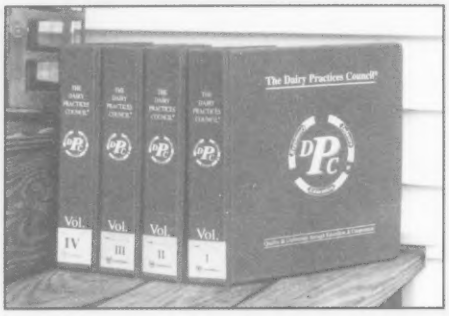

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For the past 32 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality milk and milk products.

The DPC Guidelines are written by professionals who comprise six permanent task forces. Prior to distribution, every guideline is submitted for approval to the state regulatory agencies in each member state. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

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THOUGHTS on Today's Food Safety...

The Role of Probiotics in Food Safety

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Press coverage of the horrors of bacteria has been extensive of late. In reality, though, most bacteria are on our side. Just as the dog, millennia ago, formed a mutually beneficial relationship with Paleolithic man, so bacteria have taken up residence with us. And just like dogs, most bacteria quietly serve us, although occasionally we encounter one that 'bites'.

When food safety is considered bacteria are generally viewed as part of the problem, not part of the solution. However, it has been known for hundreds of years spoilage-prone food would stay wholesome if allowed to ferment, a testimony to the role of lactic acid bacteria in safely preserving food. Almost one hundred years ago, a Russian scientist, Elie Metchnikoff, postulated that bacteria present in fermented milks not only improved the safety of milk but contributed to the long, healthy lives of Bulgarians. Today, there is growing appreciation of the positive roles bacteria play in human health.

Probiotics, live microorganisms that impart a healthful effect when consumed by, or applied to, humans or animals (for review, see www.ift.org/publications/sss/probiotics.pdf), offer a novel strategy for helping to protect us from pathogens that, despite our best efforts, still enter our food and water supplies. The emerging international recognition of the importance of probiotics was reflected in a session convened in October 2001 by the FAO/WHO in Cordoba, Argentina to discuss the role of probiotics in enhancing human health (the report can be downloaded from www.fao.org/es/ESN/probio/report.pdf).

One tactic for applying probiotics to food safety is to use them to decrease the likelihood that agricultural animals are carriers of pathogens. For example, a product developed by the USDA, Preempt (www.ars.usda.gov/is/pr/1998/980319.preemptqa.htm), which is a blend of 29 bacterial strains has been applied to newly hatched chicks. Preempt decreased the incidence of *Salmonella*-positive chicks by half in field tests and decreased by 99.9% the levels of *Salmonella* in laboratory-infected chicks. Sources at USDA have indicated that Preempt products effective in pigs and cattle have also been developed, and other probiotic strains that have been evaluated have been found effective for similar use in animal agriculture.

People are the most common target probiotic users. Probiotics are consumed as food ingredients (in the United States, mostly in yogurt or other fermented milk products, although product diversity is much greater worldwide), or as dietary supplements, in the form of capsules or pills. Probiotics have been studied with regard to a plethora of different health effects, but particularly relevant to food safety is the ability of some strains of probiotics to protect against pathogens. This has been documented in animal models, that demonstrate decreased mortality, translocation of the organism across the intestinal wall, or infection in animals challenged with a pathogenic bacterium but given a probiotic (Ogawa et al., 2001). In humans, the protective effects of probiotics (especially *Lactobacillus rhamnosus* GG) against rotavirus infection in children have been demonstrated repeatedly. Recurrence of *Clostridium difficile* colitis has been successfully prevented with different probiotic preparations. The incidence of travelers' diarrhea and of antibiotic-associated diarrhea has been reduced by probiotic consumption. Some preliminary evidence has been generated on in vivo anti-*Helicobacter pylori* activity of probiotic preparations. Taken together, these results suggest a protective effect of some probiotics against pathogens encountered by the gastrointestinal tract. The mechanism for this effect is likely multifaceted. Physical blocking of attachment sites, direct interference with virulence mechanisms and enhancement of immune function are all likely contributors.

The future for an increasing role of probiotics in human health looks bright. Probiotics may play a role in decreasing the allergic response to milk, and atopic allergic responses may also be reduced with probiotic feeding. Results of a recent blind, placebo-controlled study have linked probiotic consumption to reduced incidence of atopic eczema (eczema rates were cut in half in the probiotic-consuming group) when probiotics were given to pregnant women and infants age newborn through 6 months (Kalliomaki, et al., 2001). It is hypothesized that exposing newborns to bacteria is an important step in developing

Continued on page 225

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